TECHNOLOGY DEPT.

# The Refrigeration Service Engineer

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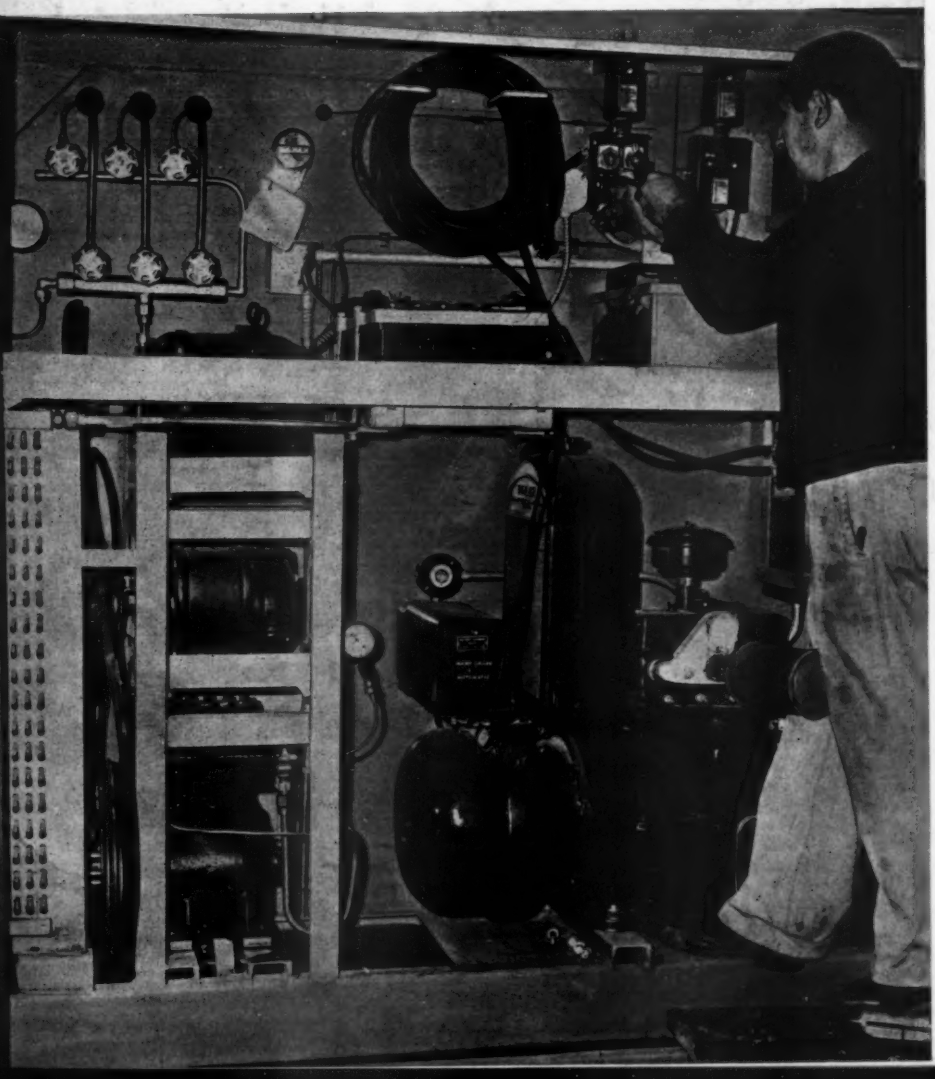

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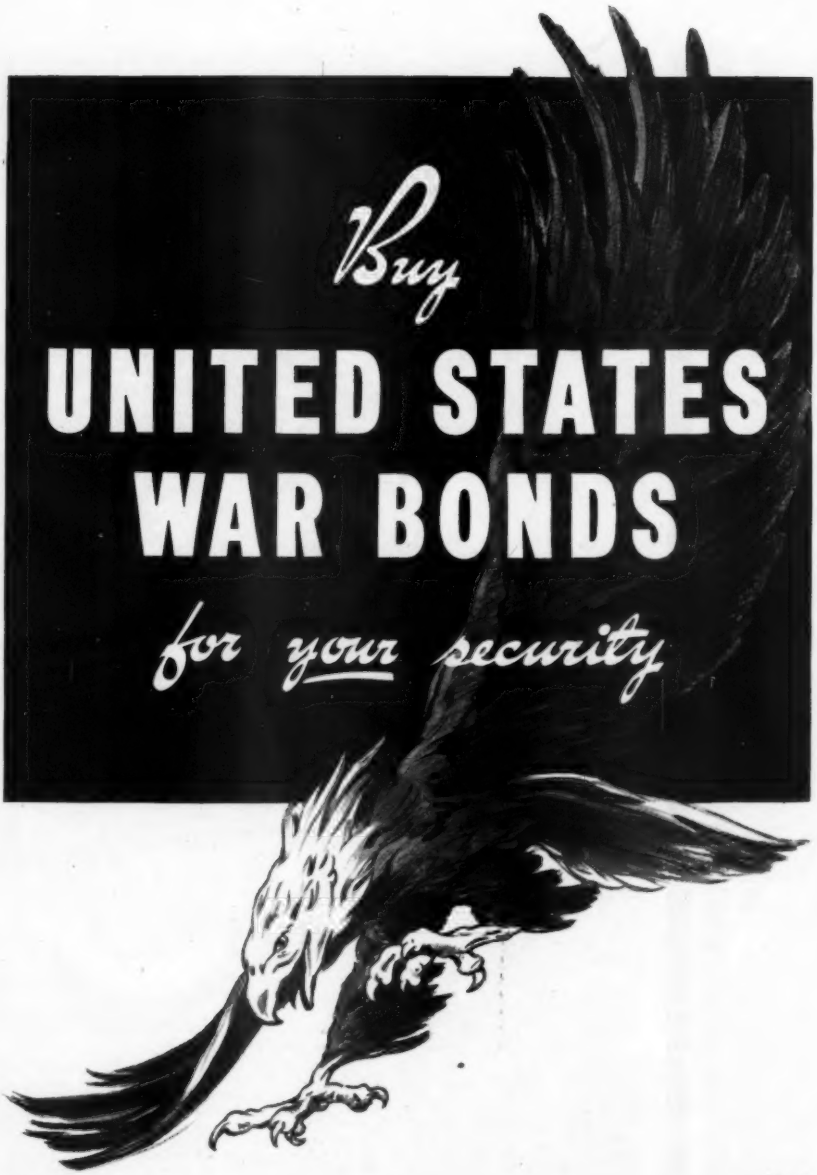


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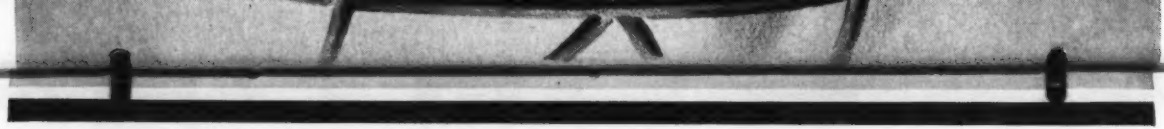

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## TODAY ☆ ☆ ☆ ☆ ☆ ☆ ☆

An enemy objective . . . a landing field, or a hidden gun emplacement may be the subject of this photograph. Subsequent handling and developing in air conditioned laboratories, and in accurately controlled photographic solutions, make sure that the vital photograph will "come out." Refrigeration and automatic control is playing an important role in the brilliant success of photo reconnaissance in our armed forces.

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*Canadian Representatives* — Railway and Engineering Specialties Limited, Montreal, Toronto, Winnipeg

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The Navy needs "Freon" . . . and gets it.
High priority warplants need "Freon" . . . they get it.
Industry needs "Freon" . . . and gets it.

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The Navy continues to get its requirements.
The warplants must get their requirements.
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**THINGS SLOW DOWN**

* * * * *

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when the warplants empty cylinders quickly,
when you empty cylinders quickly

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Then the Navy gets more.
Then the warplants get more.
Then industry gets more.

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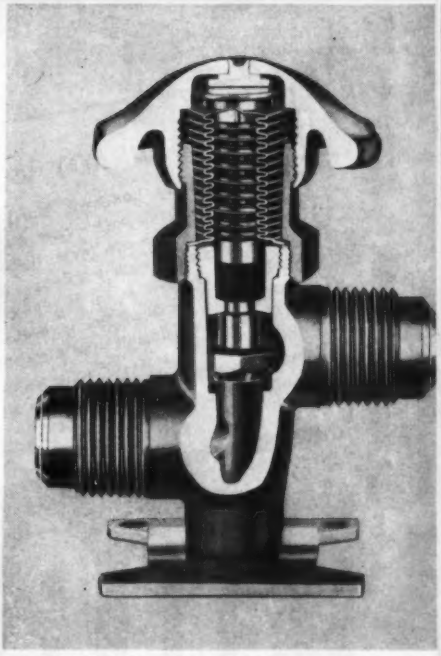

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*Refrigeration Instruments*

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U. S. Maritime Commission Photo

Before Pearl Harbor, Alco was manufacturing special valves particularly adapted to marine service. Today, more and more Alco Refrigerant Controls for marine service are sailing the seven seas with the United States Merchant Marine.

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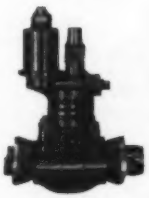
TYPE TCL

TYPE SI



TYPE EPR

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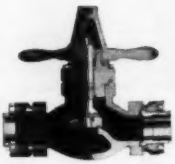
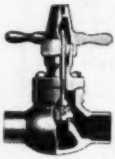
## VALVES

Balanced-Action Diaphragm Packless Valve Type 626



Semi-Steel Flanged Globe Valve Type 223



Wing Cap Valve Type 203

Relief Valve Type 541

Snap-action Diaphragm

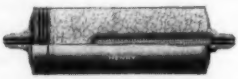
## STRAINERS

"Y" Strainer Type 895

Angle Strainer with Solder Connection, Type 866

## DRYERS

Abso-Dry, Pressure Sealed



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Dehydrator with Side Outlet, Type 756

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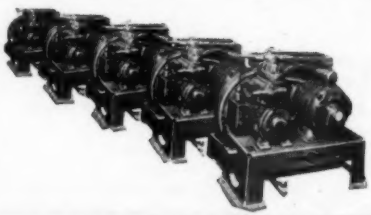

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# The Refrigeration Service Engineer

Vol. 11 No. 3

March, 1943

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

## Cover

Building refrigerators for the Navy. View of the electric generating unit, battery-operated, supplying power where no power is available. See article on page 53.

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The Refrigeration Service Engineer

Vol. 11, No. 3 CHICAGO, MARCH, 1943 $2.00 Per Annum

# News Briefs on Government Orders

## Order P-126 Amended Again

UNDER the terms of Preference Rating Order P-126 as amended February 6 by the Director General for Operations, a dealer engaged in emergency repair service of refrigerating and air-conditioning systems may apply preference ratings assigned by the order if he holds a certificate of authority. The certificate, issued on Form PD-472, is evidence that the dealer is operating as an "emergency service agency," as defined by the order.

This provision appeared in the original order issued in April, 1942, but P-126, as amended January 19, and published in the February issue of THE REFRIGERATION SERVICE ENGINEER required the dealer to exhibit an unrevoked counterpart of the order as evidence that he qualified as an "emergency service agency." The latest change has been made to simply the administration of the order.

## Restrictions on Cork Relaxed

BECAUSE the supplies of cork in this country have more than doubled since June, 1941, the Director General for Operations on February 20 relaxed the restrictions of General Preference Order M-8-a governing the use of cork and cork products.

The principal change in the order as amended is the elimination of restrictions on the processing and delivery of cork insulation board. The main use of this board at present is for refrigerator construction for the preservation of food. In addition, however, this action will also make this board available for other uses.

According to the Cork, Asbestos, and Fibrous Glass Division of WPB, there is at present enough cork in the country to last for at least three years on a non-substitutable basis. In addition, imports are continuing regularly at present, and industry owns a substantial inventory of finished products.

## Status of Water Coolers

THE 1943 production requirements for self-contained mechanical drinking water coolers can be substantially reduced with resultant savings in steel, copper and manpower, if watercoolers of this type are installed for essential use only. This conclusion summarizes recommendations on essentiality made in a Task Committee report presented to the Water Cooler Industry Advisory Committee at a recent Washington meeting.

The report lists five categories in which the use of mechanical drinking water coolers is considered essential and recommends prohibition of the use of these water coolers in one category. A change in the optimum tem-

*(Continued on page 40)*

# Service Pointers

## Practical Service
## How They Meet
## and Service

NOTE: In this series of articles a number of practical service men show a commendable cooperative spirit in passing on to others information on special repair and service problems that may be of much value in these trying times of material scarcity and shortage of competent help. We believe if more readers would send similar contributions, making THE REFRIGERATION SERVICE ENGINEER a medium for the exchange of information and experiences on service, much benefit would accrue to all. Similar contributions are solicited from other readers. See special announcement on the next page.—Editor.

### "DON'TS" IN SERVICING MODEL "CA" GENERAL ELECTRIC UNITS

By John K. Bush

ALL General Electric units using Methyl Formate as a refrigerant are designated by the letters "CA" in the model number. This particular model has some very peculiar characteristics and due to the few of them in service the following "don'ts" should be interesting and helpful in preventing serious trouble and possible damage to the machine:

"Don't" open purging screw unless the refrigerant temperature in the condenser is above 88° F.

"Don't" open purging screw in a confined space or in the presence of a flame. Methyl Formate is inflammable.

"Don't" open purging screw until a few drops of oil have been placed in the purging screw socket and a leak at this point thoroughly checked. If a leak is present the oil will be sucked in when the condenser is cool (below 88°) and the unit idle or bubbles will appear in the oil when the condenser is warm (above 88°) and the unit running. A leak at this point may usually be corrected by opening and closing the purging screw several times.

"Don't" open the purging screw more than 1/12 of a turn. Opening further may result in the purging of refrigerant and not the non-condensibles.

"Don't" open the purging screw so far that the oil previously placed in the socket will be blown out.

"Don't" purge beyond the point where the float valve heat equals that of the upper condenser coils.

"Don't" leave the job until the purging screw has been checked for a leak after purging.

"Don't" try to purge unless condenser is hot and machine is running.

"Don't" leave purging screw open more than two minutes. If float temperature does not reach condenser temperature leave closed one minute and open again for two minutes. Continue this procedure until even temperature is obtained.

I believe if all these "don'ts" are observed, the service engineer will have little trouble due to non-condensibles with these machines.

Very few leaks have developed in these machines except at the purging screw so too much emphasis cannot be placed on the importance of being sure there is no leak at this point.

### DIRECTION OF ROTATION OF FRIGIDAIRE COMPRESSORS

By Kenneth Shea

IF you are in doubt, it is safe practice to operate all Frigidaire reciprocating type compressors in a clockwise direction of rotation when facing the flywheel end of the shaft.

The Nos. "0" and "1" compressor bodies depend upon splash lubrication because they do not have oil grooves in the main bearings. While these bodies will operate in either direction, the standard factory practice is to run them in a clockwise direction of rotation when facing the flywheel end of the shaft.

Oil grooves are cut into the Nos. "2," "3," "4," "5," and "6" bodies and the main bearing has oil pick-ups on the connecting rods. These bodies must be operated in a clock-

# Men Tell Special Repair Problems

**CIGARETTES FOR SERVICE POINTERS**

**Below is a letter from a reader suggesting that a fund be started to send cigarettes to Refrigeration Service Men now serving in the armed forces. To express our approval of that idea we are offering $2.00 for every service pointer (more if it is more than 400 words). The writer may then designate one or more men (or women) in the armed forces to whom we will send the equivalent in cigarettes. If no name is designated, we will send them to a member of his Chapter RSES, or if he does not belong to the RSES, we will send the money to the U.S.O. Or, if preferred, we will send check direct to the contributor. Because of shortage in shipping space, this offer applies only to those within the borders of the United States. Contributions are invited from all readers.**

wise direction only when facing the flywheel end. If they are not, the bearings will eventually fail because of lack of adequate lubrication.

The Nos. "7" and "8" compressor bodies are equipped with rotary oil pumps for forced feed lubrication. These bodies must be operated in a clockwise direction of rotation when facing the flywheel. The special No. "8" body for railroad air conditioning purposes is the only exception to this rule. This body is constructed so that thes oil pump will operate while the compressor is running in either direction.

## WORN FELTS ON DELCO MOTORS CAUSE ERRATIC OPERATION

By E. A. Plesskott*

QUESTION 537 in the February issue of R.S.E. brings to mind a trouble encountered now and then on Delco capacitor motors. This may be the answer to a difficult trouble to locate.

The points on the contact arm of the motor become dirty with the result that at times the starting winding on the motor is not in the circuit causing the overload to trip. Should the door of the box be opened and slammed shut, the contacts may make and if this should happen at a time when the overload has cooled off enough to make contact, the motor would start as usual. Any jar would have this same effect. It is possible to clean the points on the arm the governor spool rides against and get continued good service in the event new ones are unobtainable. But new ones are always preferable and their cost is nominal.

International President, R.S.E.S.

## PREVENTING SUCTION VALVES FROM STICKING

I WANT to convey to fellow members of R.S.E.S. a service hint on how to prevent the suction valves from sticking on the 50,-000 and 7-FO series Brunswick compressors.

After purging the compressor in the usual manner, remove the compressor head and discharge valve plate. Next remove the suction valve disc retainer and discs and clean all parts with carbon tetrachloride to remove all traces of sludge. Then, from a watch spring about ⅛ inch wide, cut enough strips ¾ inch long for each disc.

With a pair of pliers bend this strip slightly in the middle to form a V shape. Insert one of these between each valve disc and the valve disc retainer making sure that when retainer is screwed down tight to piston that both disc and spring are free. Replace discharge valve plate and head, and compressor is ready to operate. This method is efficient, economical and simple, and the job really stands up. I have repaired compressors in this manner several years ago and they are still operating efficiently.

**As a member of R.S.E.S., I feel it a duty to pass on for the benefit of all members any knowledge that I have gained in the field of practical experience and this without monetary consideration. If, however, you feel that compensation is due me for this service hint, I would suggest that you use it to send cigarettes or some other suitable article to our members now serving in the armed forces.—Thomas Hughes.**

*Mr. Hughes: Your suggestion is well taken. See notice above. If you will send name and address of a service man, a carton of cigarettes will be sent to him immediately.—Editor.*

# Practical Application of Capillary Tube

By Wm. E. Anglin *

THE following is what I believe to be practical applications of the capillary tube. When properly applied and installed, it will in many instances make a more efficient unit.

Here are things to remember in using the capillary tube:

1. The tubing should be the correct length and size orifice to allow the condensed liquid refrigerant to pass into the evaporator as soon as condensed. The length varies with different refrigerants. Too much restriction (or tubing) would cause a more completely filled condenser of pure liquid, and higher condensing pressures than necessary; when actually what we desire to obtain is to allow the liquid (which should be in the last row only of the condenser) and pass directly into the evaporator.

2. Do not use a liquid receiver with a capillary tube. On the off cycle the added amount of refrigerant, and some hot gas which was in the top of the receiver, and some of the condenser gas will pass over into the cold evaporator, and warm the evaporator up thereby causing the off cycle to be shorter, especially on a dry type evaporator.

3. Always use a good filter of not less than 200 mesh screen before the restrictor tube, such as Zenith, AP Trap-it, or Pebbled Brass Type.

4. Whenever possible with a dry type evaporator use or make an accumulator to collect surge-over liquid that empties from the condenser on the off-cycle. You should at least solder the restrictor tube to the suction line as a heat exchanger.

5. If you have a large capacity high side as a twin-cylinder, it will take less tubing than a single-cylinder.

6. It is important that you do not have too much oil in the system, especially with Freon.

7. Not all capillary tubing is the same inside diameter. This information is taken from experience with .032 I.D.

8. Unit will require less refrigerant than the original amount when using a restrictor tube.

9. Charge is very important with the capillary tube. Charge the unit so that the suction line frosts just as it comes out of the evaporator just as the unit starts on the running cycle; or overcharge unit slightly, then purge the excess.

10. Capillary tubes are not satisfactory on applications where the refrigerator will be subject to temperatures below freezing, due to the fact that the oil becomes too cold to flow properly through the restrictor.

11. Capillary tubes are not satisfactory on rotary compression units.

12. Remote installations may be made if a 3/16 inch or ¼ inch tube is installed from condenser in the basement to above the floor, then the restrictor tube soldered on and run into the evaporator.

13. On a high side float installation in the bottom of the refrigerator I also use a piece of capillary 6 to 10 inches long at evaporator end of liquid feed in place of pressure reducing valve.

14. I recommend soldering of capillary tube by Sil Fos, Easy Flo, or Phos Copper rather than 50-50 or 95-5 as there is less chance of the solder plugging the end of the tube. This is important: put capillary tube into other tube or fittings far enough to prevent solder flowing around the tube and plugging it.

15. Prevent vibration on capillary tube, as it will soon crystallize and break off.

## Replacing High Side Floats

To replace high side floats on DR1 and DR2 General Electric units, I removed the old float from the top and cut it in half. Then I took bottom half of an old Gibson or Grunow float ball and inverted it into the top half of G.E. float and brazed it in. Then I put a hole for a ¼ in. tube three inches long and brazed it into the inverted half of the ball. This brings the ¼ in. line inside of the cabinet. Braze capillary tube to this ¼ in. line and evaporator tube. This does not spoil the looks of the original float, and works very satisfactorily. See sketch Fig. 1 on following page.

On 1936 Leonard F12 Model, and all machines that originally had heat exchangers

* Capitol Refrigeration Co., Lansing, Mich.

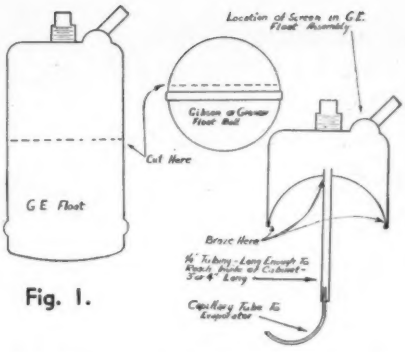



Fig. 1.

built into the float, we coil and solder most of the restrictor tube around the suction line.

On Grunows to replace carrene meters which have been hard to obtain for some time, I have used a practical substitute. Take a ⅜ in. AP Trap-It and install on the outlet end of it a ⅜ in. female SAE connector and a ⅜ in. tee. On the extended upward end of this tee use a flared ⅜ in. tube 4 or 5 inches long with nuts and plug for purging. On outlet end of Trap-It use a ⅜ in. flare nut tapped out with ⅛ in. IPT. Thread a ⅛ in. IPT plug drilled for capillary tube and solder the plug into the tube, 25 in. capillary tubing and short piece of ¼ in. soldered on the outlet end. See Fig. 2.

I remove F114 from the Frigidaire Meter Miser units and do not lose the gas by the following procedure:

Put either an Imperial by-pass tool on discharge line of compressor at top of the condenser, or use hermetic kit on liquid line, and place empty cylinder in pasteboard box with two pounds of dry ice packed to come in contact with the cylinder. Connect the cylinder to the Hermetic or by-pass tool. Then start the unit. If it won't start, heat the evaporator first, then the condenser bottom to top slowly, and the cold cylinder will create a vacuum, and with the heat, will draw the F114 out. You can watch the gauge on the tools and balance the pressures.

I have experimented with the restrictor tube on most all household units and some individual installations on commercial as industrial chillers of minus 50 degrees F. with Freon up to ½ hp.

On the industrial chiller, it was a cabinet of 4 cu. ft. capacity, 6 Kold-Hold plates, heat exchanger, F12 refrigerant, ½ hp. Kelvinator unit. It was hooked up with valve between condenser and receiver, and we cut out the use of the receiver except to pump down low side. We used 14 ft. of ⅛ in. tubing as on TX valves, and obtained minus 50 degrees F. Later we used Propane, F12, and refrigerant obtained minus 70 deg. F.

### Machines and Restrictor Tubes

Following is a list of machines on which I have used the restrictor tube with very satisfactory results. These lengths of tubing are based on tubing that is .095 O.D. and, most important of all, it is .032 I.D.

Use these lengths as basis for figuring amount of tubing for household applications: Sulphur Dioxide, .032 I.D., 7 ft.; Methyl Chloride, .032 I.D., 5 ft.; Freon, .032 I.D., 6 ft.

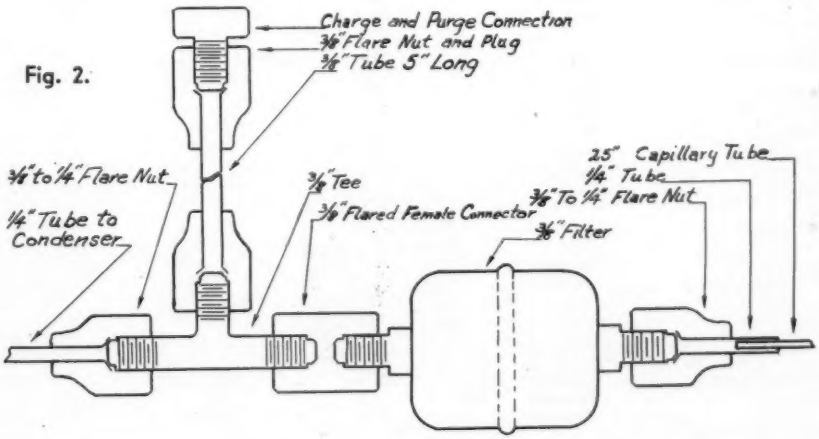



Fig. 2.

## TABLE I. DATA ON MACHINES AND RESTRICTOR TUBES

| MAKE | Size | Refrigerant | Original Control | Capillary Tubing |
|---|---|---|---|---|
| Apex | Single | SO | Ex Va | 7 ft. |
| | Twin | SO | LSF | 6 ft. |
| Atwater Kent | Single | MC | T Ex Va | 5 ft. 6 in. |
| Briggs | Single | SO | Ex Va | 6 ft. 6 in. |
| | Twin | SO | Ex Va | 6 ft. |
| Buckeye | Single | SO | Ex Va | 7 ft. |
| Copeland | Single | ISO | Ex Va | 6 ft. |
| | Single | MC | Ex Va | 5 ft. |
| | Twin | MC | Ex Va | 4 ft. 6 in. |
| Crosley | Single | SO | Cap T | 7 ft. |
| | Single H | F12 | HSF | 6 ft. |
| Electro-Kold | Single | MC | Ex Va | 5 ft. 6 in. |
| Fairbanks-Morse | Single | SO | Ex Va | 6 ft. 6 in. |
| | Single | MC | Ex Va | 5 ft. |
| Frigidaire | Single | SO | Ex Va | 6 ft. 6 in. |
| | Twin | SO | HSF | 6 ft. |
| | Twin | F12 | HSF | 5 ft. 6 in. |
| Frigidaire 1934-35 | Hermetic | F114 Replacing with Herveen or F21 | Cap T | 22 ft. |
| Frigidaire 1936 and later | Hermetic | F114 | Cap T | 16 ft. 6 in. |
| Gale | Single | SO | T Ex Va | 6 ft. 6 in. |
| | Twin | SO | T Ex Va | 6 ft. |
| | Hermetic | F12 | Cap T | 6 ft. |
| General Electric | Hermetic DR1-2 | SO | HSF | 8 ft. |
| | Rotary | SO | HSF | 8 ft. |
| General Electric 1937 | Hermetic | SO | HSF | 6 ft. 6 in. |
| Gibson | Hermetic Twin | SO | HSF | 5 ft. |
| | Hermetic Single | F12 | Cap T | 6 ft. |
| Grunow | Model C | Car | HSF | 30 in. |
| | Model D and later | Car | Meter | 25 in. |
| Hotpoint | Rotary | SO | HSF | 8 ft. |
| | Hermetic | SO | HSF | 6 ft. 6 in. |
| Kelvinator | Single | SO | Ex Va | 7 ft. |
| | Single | SO | HSF | 6 ft. 6 in. |
| | Twin | SO | HSF | 6 ft. |
| | Hermetic | F12 | Cap T | 6 ft. |
| Leonard | Single | SO | HSF | 6 ft. 6 in. |
| | Twin | SO | HSF | 6 ft. |
| | Single | F12 | HSF | 6 ft. |
| | Hermetic | F12 | HSF | 6 ft. |
| Mayflower | Single | SO | Cap T | 7 ft. |
| | Hermetic | F12 | Cap T | 6 ft. |
| Sanitary | Single | SO | Ex Va | 6 ft. 6 in. |
| | Single | MC | Ex Va | 5 ft. |
| Servel | Twin | MC | HSF | 4 ft. 6 in. |
| | Single | MC | HSF | 5 ft. |
| | Hermetic | MC | Cap T | 5 ft. 6 in. |
| Sparton | Twin | SO | Ex Va | 6 ft. 6 in. |
| | Single | SO | Ex Va | 6 ft. 6 in. |
| Stewart Warner | Single | SO | Ex Va | 6 ft. 6 in. |
| | Twin | SO | LSF | 6 ft. |
| | Hermetic | F12 | Cap T | 6 ft. |
| Universal Cooler | Single | MC | Ex Va | 5 ft. 6 in. |
| | Twin | MC | Ex Va | 5 ft. |
| | Single | F12 | Cap T | 6 ft. |
| | Twin | F12 | T Ex Va | 5 ft. 6 in. |
| | Twin | MC | Ex Va | 4 ft. 6 in. |
| Westinghouse | Hermetic | SO | Ex Va | 7 ft. 6 in. |
| | Hermetic | SO | HSF | 7 ft. |
| | Hermetic | F12 | HSF | 6 ft. |

# The Construction of Compressor Bodies

**NOTE: The construction of compressor bodies is described in the following series of articles in order to give service men a more comprehensive appreciation of how the compressors are constructed, thus providing them with a more complete idea as to how to dismantle and assemble them during repairs and adjustments. Although the compressor described in this and other articles to follow are made by the Williams Oil-O-Matic Heating Corp., Bloomington, Ill., construction details and especially construction principles apply also to other makes.—Editor.**

## Compressor Body No. WR-450

COMPRESSOR body No. WR-450 has a bore of 1⅝-inch, stroke of 1½-inch, twin cylinder, and is used on Models B and BB compressor units. Compressor body No. WR-449 has the same specifications except the cylinder bore, which is 1½-inch. This compressor body is used for Model A series compressor units.

### Eccentric Shaft and Straps

The eccentric shaft is made of one piece drop-forged steel, hardened and ground to size. This shaft is held in proper alignment by the bronze thrust bearing on the one end and the seal spring at the pulley end.

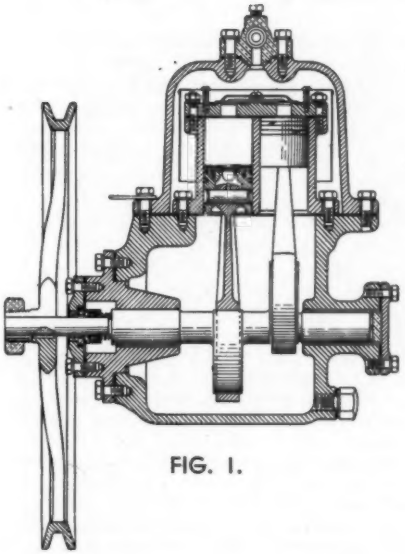


FIG. 1.

The eccentric straps are cast-iron and the wrist pins and eccentric bores are ground to size.

The suction valve for the compression chamber is located in the head of the piston. This valve is of the disc type and is illustrated in Fig. 2. The bottom of this valve must be lapped and makes contact on a raised seat in the piston head. This valve is retained in place by a retainer plate, which is secured to the top of the piston

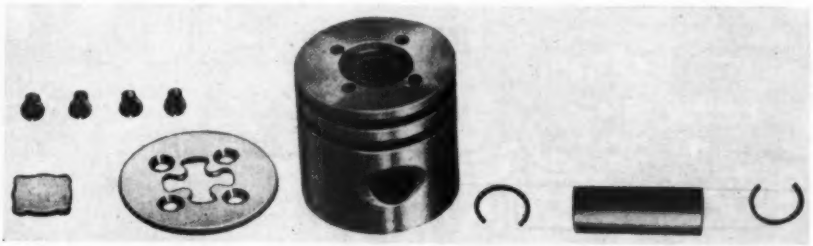


FIG. 2.

by four screws. *Caution.* It is important that these screws are staked in place when assembling. Otherwise, a screw may work loose in operation and due to the slight clearance between the top of the piston and the cylinder head, serious damage may result.

The lift of the suction valve in compressor body No. WR-450 is .008 to .010.

The wrist pin floats in the piston, but the end thrust is limited by a retaining spring at each end.

The discharge valves used are of the flapper type. At the top of the port in the cylinder head is a raised seat, which is lapped to a smooth surface. The lower leaf of the valve assembly might be termed the valve proper. Two springs mounted on top of this valve exert proper tension against the valve, to seat it against the cylinder head. A bridge in the center holds the entire flapper valve assembly in place.

This compressor body is equipped with a patented oil separating device, for separating lubricating oil from the methyl chloride vapors and returning it to the crankcase. This assembly is shown in the cross-sectional view in Fig. 3. By referring to this figure it will be noted that an inverted baffle is mounted over the cylinder head assembly. Consequently, the methyl chloride vapors do not pass directly out of the discharge tube, but must pass down on the inside of the baffle and then up between this baffle and the dome.

In this course of travel between the baffle and the cylinder block, the oil is precipitated out and flows down into the oil valve chamber. When sufficient oil has accumulated to raise the float to open the needle valve, the pressure of the methyl chloride in the dome forces the oil into the crankcase. As the oil is forced into the crankcase the oil float lowers and closes the needle valve again. The tube leading from the needle valve across the crankcase is for the purpose of allowing the oil to splash against the side of the crankcase and run down the sides to the oil level. In this process much of the methyl chloride dissolved in the oil is liberated, before mixing with the oil in the crankcase.

The purpose of the tube extending down in the oil float (See Fig. 3) is to prevent the float from collapsing in case excessive pressure develops in the high side of the system. With this arrangement the pressure on the inside of the float is essentially the same as on the outside, due to equalization through the tube.

Should any oil find its way into the float through the tube mentioned, it is forced out before operation is seriously affected, due to fluctuation in pressure.

Some of the floats furnished on the earlier models were not equipped with this tube. Consequently, in the event that a collapsed float is found, repetition of the trouble can be avoided by installing a new type float with the tube.

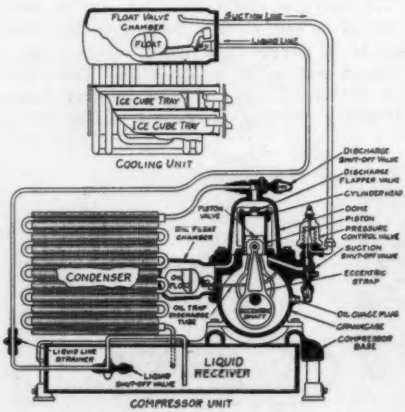



FIG. 3.

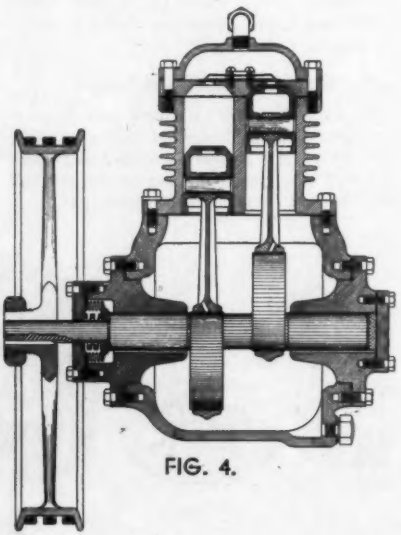


FIG. 4.

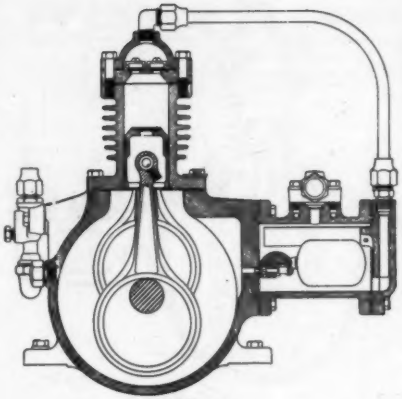


FIG. 5.

In case of leakage through the oil float valve, the trouble can frequently be corrected by simply tapping the oil float valve chamber with a hammer. This has a tendency to seat the valve. If it does not correct the trouble it is necessary to remove the oil float valve chamber and inspect the oil float mechanism. The trouble may be due to dirt under the needle stem or due to a distorted seat or needle.

## Compressor Body RC-144

Compressor body No. RC-144 has a bore of two inches, stroke of 2⅜ inches, twin cylinder, and is used on Models C, D and E compressor units prior to February, 1932. The changes between Figs. 4 and 6 were made gradually and not all at one time. Consequently some of the improvements shown in Fig. 6 were incorporated prior to February, 1932.

### Eccentric Shaft and Straps

The eccentric shaft and the eccentric strap are of the same design and dimensions as in the later model RC-144 compressor body, illustrated in Fig 6, with the exception that the latter shafts are tapered for the compressor pulley and the pulley held in place with a nut on the end of the shaft.

Inasmuch as the eccentric shaft illustrated in Fig. 4 is not tapered, the pulley used must have a split hub. The pulley is then tightened on the shaft with a large nut on the hub, this hub being tapered on the outside so that it is drawn together as the nut is tightened. Some of the first compressors of this type were equipped with a brass nut on the pulley hub. This was later replaced with a steel nut and if trouble is experienced in keeping the pulley tight, a steel nut should be installed. A pulley with a bolted hub is also available and entirely eliminates trouble in this respect.

### Suction Valves

The suction valve in the top of the piston is of the disc type. All of the units up to Serial No. 6329 were originally constructed with a spring retainer. In some cases trouble was encountered due to breakage of this retainer. The design was then changed and the spring retainer was replaced with a plate, which is secured to the top of the piston by four screws, which are staked after being tightened in place. The suction valve was not changed. In order to accommodate the plate retainer the piston has been machined so that the overall length of the piston is the same after the plate is installed as when the spring retainer was used. In case trouble is encountered in the field with any of the spring retainers, the piston should be replaced with the new type having the plate retainer.

## Compressor Body RC-144A

Compressor body No. RC-144A has a bore of two inches, stroke of 2⅜ inches, twin cylinder, and used on Model H compressor units beginning May, 1932, and Model C compressor units beginning October, 1931.

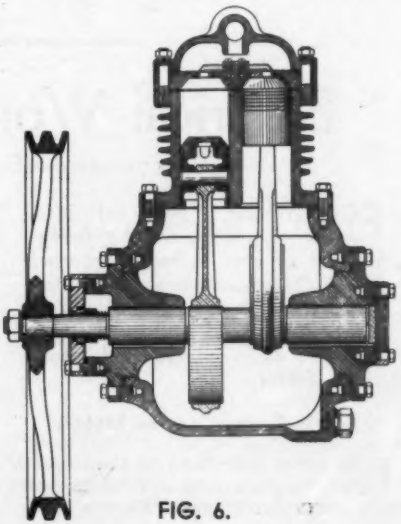


FIG. 6.

### Pistons

The heads of the pistons are tapered and there are corresponding recesses in the bottom of the cylinder head. (See Fig. 6.) This greatly reduces the amount of compressed vapors in the cylinder head between the top of the piston when at the upper end of its stroke and the flapper valve, thereby increasing the efficiency of the compressor as these vapors expand into the cylinder chamber when the piston moves downward.

The suction valve in the top of the piston is of the disc type, and is held in place by a plate retainer. This retainer is secured to the top of the piston by four screws. It is important that these screws are staked after being tightened in place, to prevent their becoming loose during operation.

The lift of the disc valve is .010 to .012 inch.

Should trouble be experienced due to the valve sticking, the retainer plate should be removed and the disc valve inspected. It may be that some foreign particle has lodged either above or below the disc valve, preventing its operation.

The shaft is tapered for the compressor pulley and the pulley is tightened in place by a nut and lock washer.

In the event that it becomes necessary to remove the pulley, the nut should be removed from the shaft by turning counterclockwise and the shaft may then be removed by tapping the hub from the rear, or by using a wheel or gear puller.

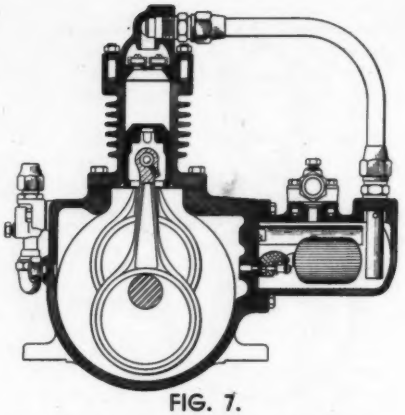


FIG. 7.

In case the eccentric shaft must be removed from the crankcase, it is first necessary to loosen the cylinder block from the crankcase and lift off the block and entire cylinder head assembly. Both removable bearings must be removed from the crankcase. The eccentric shaft can then be slipped out through either end of the crankcase. However, as it is being removed, the shaft must be slipped out of the eccentric straps.

### Oil Separator

The oil separator incorporated in the construction of this compressor body is illustrated in Fig. 7. All the methyl chloride

*(Continued on page 40)*

# Electrical Work and Motors

(CONTINUED FROM FEBRUARY ISSUE)

**FOLLOWING is the fourth in a series of articles on the fundamentals of electric motors started in the December issue. While the information is not new, the subject, we believe, is of sufficient importance to claim interest and attention.—Editor.**

### Service Instructions on Motors

THE tables reproduced on the four following pages are from a bulletin published by the Wagner Electric Corp., giving detailed service instructions for capacitor - start induction - run motors and split-phase motors. While this information applies particularly to Wagner motors, it also applies in general to any make of electric motor, and therefore it will be found of value in locating the more common motor troubles.

The tables are set up in such a way as to make available immediately the desired information, first stating the problem, then the probable cause, how to make a test to help determine whether the diagnosis was correct, and then how to apply a suggestive remedy.

| PROBLEM | PROBABLE CAUSE | TEST AND REMEDY |
|---|---|---|
| (A) FAILURE TO START | 1. Blowing of fuses or operation of overload device. | 1. Examine motor bearings, be sure that they are in good condition and properly lubricated. Be sure motor and driven machine both turn freely. Check circuit voltage at motor terminals against voltage stamped on motor name plate. Examine overload protection of motor. Overload relays operating on either magnetic or thermal principles, or a combination of the two, offer adequate protection to the motor. Ordinary fuses of sufficient size to permit motor to start do not protect motor against burnout. A combination fuse and thermal relay such as the Buss Fusetron protects the motor and is inexpensive. If motor does not have overload protection the fuses should be replaced with overload relays or Buss Fusetrons. After installing suitable fuses and resetting overload relays, allow the machine to go through its operating cycle and if protective devices again operate, check the load. If motor is excessively overloaded take up with the appliance manufacturer. |
| | 2. No voltage or low voltage. | 2. Measure volts at motor terminals with switch closed. See that it is within 10% of voltage stamped on name plate of motor. |
| | 3. Open-circuited field. | 3. Indicated by humming sound when switch is closed. Examine for broken wires, loose connections. |
| | 4. Improper current supply. Incorrect voltage or frequency. | 4. Requires motor built for operation on power supply available. A. C. motors will not operate on D. C. circuit or vice versa. |
| | 5. Condenser short circuited or open circuited (Type RK, RBZ). | 5. See F. |
| | 6. Improper line connection. | 6. See that connections are exactly like connection diagram which is sent with motor. (See Figure 3.) |
| | 7. Excessive load. | 7. If the motor starts idle and if all the above conditions are O. K. then failure to start is most likely due to excessive load. To determine this definitely make or have a reliable electric shop make a test of starting torque. Most Wagner fractional horse power capacitor-start induction-run motors have a starting torque of 400% or more of full load torque. If the load requires more than this a larger motor is required.<br>If this figure is 400% of full load torque and motor fails to pull in, consult the nearest Wagner Branch inasmuch as this would indicate either a misapplication of the motor, resulting in too great a load, or an increased load due to faulty driven apparatus.<br>To Determine the Load:<br>a. PRONY BRAKE (See Figure No. 1). This method is probably the most generally used. It requires a pulley, brake arm and scale (may be either platform scale or spring balance, if platform scale be sure that load is applied to center of platform, if spring balance is used the pull must always be at right angle to the brake arm, and in either case scale must have small enough variations to accurately read torque on smaller rated motors). Brake arm should be made up so that the distance between center of pulley and contact point where load is measured is exactly 12 inches. Scale reading will then be in pounds feet. BEFORE STARTING TEST MAKE SURE THAT DIRECTION OF ROTATION IS SUCH THAT BRAKE ARM WILL BE MOVED AGAINST BALANCE. In order to measure starting torque clamp arm to pulley tight enough to allow pulley to turn very slowly — read scale when slowly turning. To measure pull in torque release brake clamp until motor is just able to pull up to speed. The true pull in torque is the highest scale reading for which the centrifugal switch inside the motor will operate.<br>b. ROPE AND WEIGHT (See Figure No. 2). This method gives equally satisfactory results and yet does not require the equipment of the Prony Brake method. It requires a smooth face flanged iron pulley, rope and weight. Tie one end of the rope to the projection from the test bench so that the rope will be at 90° to the shaft. Wrap the rope around the pulley opposite to the pulley rotation and hang a weight on the free end of the rope. Wrap sufficient turns around the pulley so that the tied end of the rope will be slack when the weight is lifted and the pulley rotates. To prevent the rope from gripping the pulley, oil or paraffin the rope slightly. Be sure that the hanging weight does not touch the floor or test bench. SOME PROTECTIVE MEASURES SHOULD BE TAKEN TO PREVENT THE WEIGHT FROM INJURING THE OPERATOR IN CASE THE ROPE GRIPS TOO TIGHT. Proceed to test as follows. Increase the weight until the motor will just start, then calculate as follows: |

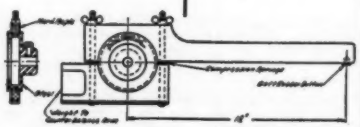


Figure 1

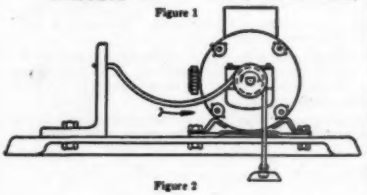


Figure 2

The problems cover a wide range of motor troubles including failure to start, excessive bearing wear, motor runs hot, motor burns out, noisy motor, tests for electrolytic condensers, and protective operation.

NOTE: This series of articles will be continued in the April issue with similar tables giving service instructions for smaller sizes of repulsion - start - induction brush-lifting motors.

| PROBLEM | PROBABLE CAUSE | TEST AND REMEDY |
|---|---|---|
| | | For example, to make starting test on a ¼ HP, 1725 RPM motor select a 4" pulley, ⅛" rope, and necessary weight. If assortment of graduated weights are not handy use bucket and sand (or shot) adding weight so that pulley is slowly turning.<br>Brake Arm = $\frac{\text{Pulley Dia. in inches} + \text{rope dia. in inches}}{12 \times 2}$<br>$= \frac{4+.125}{24} = .172$ Ft.<br>Starting Torque in Lb. Ft. = Brake Arm x weight hung on rope = .172 x weight.<br>Full Load Torque in Lb. Ft. = $\frac{\text{Full Load HP} \times 5250}{\text{Full Load RPM}}$<br>$= \frac{.25 \times 5250}{1725} = .76$ Lb. Ft.<br>Starting Torque in Percent of F. L. Torque = $\frac{\text{Starting Torque}}{\text{Full Load Torque}}$<br>While both of these methods are widely used by small service organizations for checking test values on electric motors of all sizes, it should be specially noted that both methods do contain an element of danger to the operator, and should be used with extreme care from the standpoint of both safety to operator and accuracy of test results. |
| | 8. Shorted stator. | 8. See C-2 below. |
| (B) EXCESSIVE BEARING WEAR | 1. Belt tension too great; unbalanced or out-of-line coupling; eccentric or too closely meshed gears. | 1. Belts, either flat or "V", should have only sufficient tension to prevent slipping. "V" belts usually require less tension than an equivalent flat belt. Slipping of belts will cause pulleys to heat (touch), squeak (sound), or burn belts (smell).<br>In case of unbalanced or out-of-line couplings or eccentric or too closely meshed gears — correct mechanical condition. |
| | 2. Improper, unclean or insufficient oil. | 2. The lubrication system of Wagner small motors provide for supplying the right amount of filtered oil to bearing. It is only necessary for the user to keep wool yarn saturated with a good grade of machine oil. |
| | 3. Dirty bearings. | 3. When bearings get clogged with dirt motor may need protection from excessive dust. Application may be such that especially constructed motor should be used — consult Wagner. |
| (C) MOTOR RUNS HOT<br>(Don't judge motor temperature by feel of hand. Measure it with a thermometer and check with temperature rise stamped on name plate.) | 1. Bearing trouble. | 1. See condition under B. |
| | 2. Short circuited coils in stator. | 2. Shorted coil may be located by fact that one coil feels much hotter than other. Very great increase over normal magnetic noise may also indicate shorted stator. |
| | 3. Rotor rubbing stator. | 3. Some extraneous matter may be between rotor and stator, or bearings may be badly worn. |
| | 4. Excessive loads. | 4. Be sure proper pulleys are on motor and machine. Driving the load at higher speed requires more horsepower. Take an ammeter reading. If current draw exceeds name plate amperes for full load, the answer is evident. |
| | 5. Low voltage. | 5. Measure voltage at motor terminals with line switch closed. Should not vary more than 10% from value stamped on name plate. |
| | 6. High voltage. | 6. See No. 5. |
| | 7. Incorrect line connections to motor leads. | 7. Check with connection diagram sent with motor. |
| (D) MOTOR BURNS OUT | 1. Frozen bearings. | 1. Causes may be same as under B. |
| | 2. Some condition of prolonged excessive overload. | 2. It is important that the load be examined carefully before the burned out motor is replaced so as to locate and remove the cause of the overload. Certain jobs such as refrigerators will under unusual conditions of operation, apply prolonged overloads which may destroy a motor and which may be difficult to locate unless examined carefully. On jobs where it is assumed somewhat intermittent service will normally prevail and which consequently are closely motored, the load cycle should be especially checked, as a change in this feature will easily produce excessive overload for the motor. Examine carefully to determine mechanical condition of the driven appliance. |

## SERVICE INSTRUCTIONS FOR CAPACITOR-START INDUCTION-RUN & SPLIT PHASE MOTORS

| PROBLEM | PROBABLE CAUSE | TEST AND REMEDY |
|---|---|---|
| (E) MOTOR IS NOISY | 1. Unbalanced rotor. | 1. When transportation handling has been so rough as to damage the heavy Wagner shipping case, it is well to test motor for unbalance conditions at once. It is even possible (though it rarely happens) that a shaft may be sprung. In any case the rotor should be rebalanced dynamically. |
| | 2. Worn bearings. | 2. If unduly frequent, examine for cause. See B. |
| | 3. Switch rattles. | 3. Install new switch hub and felt washer. |
| | 4. Excessive endplay. | 4. End play should be reduced as near as possible to zero. In doing this be sure the bearings do not bind. *Rotor must turn freely*. Washers supplied by factory should be used in making this adjustment. |
| | 5. Motor not properly aligned with driven machine. | 5. Correct mechanical condition. |
| | 6. Motor not firmly fastened to mounting base. | 6. All Wagner small motors have steel bases so they can be firmly bolted to mounting without fear of breaking. It is, of course, not to be expected that the base should be strained out of shape in order to make up for roughness in mounting base. |
| | 7. Loose accessories on motor. | 7. Such parts as oil covers, capacitor box or cover, guards, if any, on end plate, etc. should especially be checked for security if they have been removed for investigation of any sort. The conduit box should be tightened when top is fitted after connections are made. Pulley must be tight on shaft. |
| | 8. Air gap not uniform. | 8. This results from sprung shaft or unbalanced rotor. (See No. 1 above). |
| | 9. Amplified motor noises. | 9. When this condition is suspected, set motor on a firm floor, and if motor is quiet, then the mounting is acting as an amplifier to bring about certain noises. This may occur even though mounting is quite firm in structure. Frequently correction of slight details in the mounting eliminates this but rubber-mounted type motors almost invariably do. |
| (F) TESTS FOR ELECTROLYTIC CONDENSERS (TYPE RK, RBZ) | 1. To obtain the capacity in microfarads. | 1. Remove all motor leads from the condenser terminal board. Apply rated voltage at 60 cycles across terminals of condenser and measure volts and amperes. The capacity in microfarads is approximately<br>$\text{Capacity} = 2650 \times \frac{\text{amperes}}{\text{volts}}$<br>The above formula applies to a test made at *60 cycles only*. This test should be made with a fuse in series with the condenser to protect the line in case the condenser is shorted.<br>Capacity of condenser should not be less than the rated value marked on cardboard case of condenser but may exceed it by any amount up to 40%. |
| | 2. Test for open circuits. | 2. Remove all motor leads from the condenser terminal board. Apply rated voltage at 60 cycles across terminals of condenser with an ammeter in series. If the ammeter shows no current reading the condenser is open circuited. This test should be made with a fuse in series with the condenser to protect the line in case the condenser is shorted. |
| | 3. Test for shorts. | 3. Remove all motor leads from the condenser terminal board. Apply rated voltage at 60 cycles to the condenser terminals with a fuse in series. If the fuse blows the condenser is short circuited. A 10 ampere fuse will be ample for testing a 110 volt condenser of 150 MF rating or smaller. For larger condensers use a heavier fuse. |
| | 4. Test for grounded condenser. | 4. To determine whether a condenser terminal is grounded to the metal container remove all motor leads and apply rated voltage between the terminal and the metal container with a 10 ampere fuse in series. If the fuse blows the condenser is grounded.<br>If both terminals are grounded to the metal container these grounds will constitute a short circuit. (See "3-Test for Shorts").<br>If only one terminal is grounded to the case no harm will result since the container is insulated from the condenser compartment by means of a cardboard box.<br>If voltage is applied between one of the terminals and the metal container a slight spark may occur when the circuit is broken. This is due to leakage of current through the electrolyte between the terminal and the metal container and does not indicate a ground or a defective condenser. The condenser is not grounded unless enough current flows when making this test to blow a 10 ampere fuse. |
| | General. | Electrolytic condensers are intended to stand intermittent applications of voltage over short intervals and will be injured if the voltage is left on too long. When making these tests the voltage should not be applied to the condenser any longer than is necessary. |

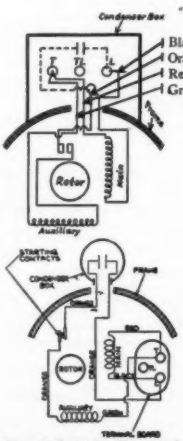
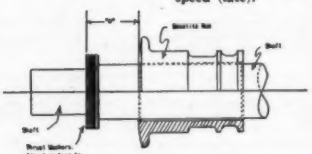



Figure 3—Connection diagrams of capacitor-start induction-run motor (Type RK, RBZ). These connections are for counter-clockwise rotation looking at the front end (switch end) of the motor.

| PROBLEM | PROBABLE CAUSE | TEST AND REMEDY |
|---|---|---|
| (G) PROTECTOR (motor mounted) trips after the motor starts but before it changes to the Induction Winding. | 1. Low voltage. | 1. Measure the voltage at the motor-terminals while the motor is operating; it should be within 10% of the voltage stamped on the motor nameplate. |
| | 2. The driven machine requires excessive torque. This may be due to high inertia or heavy load. | 2. Measure the time required for the motor to come from zero to a constant speed. This acceleration period *must not* exceed 2 reconds for types RB and RB-5 (GB) or 3 seconds for type RK (RBZ). It usually is on the order of 0.5 to 1.0 second. If the long acceleration period cannot be overcome by oiling and greasing bearings, correcting obvious mechanical defects, etc., take the matter up with the appliance manufacturer. |
| | 3. The centrifugal switch opens at too high a speed (late). | 3. Measure the speed at which the centrifugal switch opens; it *must not* exceed 1300 rpm on types RB and RB-5 (GB) and 1500 rpm on type RK (RBZ) 60 cycle motors. When found to exceed this limit, examine the motor assembly. The following specifications on the 56, 57, 60, and 65 RB, RB-5, and RK, 1725 rpm motors will probably give satisfactory opening speed.<br>2—Governor Weight Springs HC-5306<br>1—Bakelite Hub HC-7310<br>Dimension "A" (See Fig. 4):<br>With felt pads new, "A" = 15/32"<br>With felt pads worn (permitting the bakelite hub to rest directly upon the moving contact arm), "A" = 7/16"<br>Motors without felt pads on moving contact arm, "A" = 7/16" (same as worn felt pad). |
|  <br>Figure 4 | 4. Defective electrolytic condenser. (Type RK, RBZ). | 4. Test the condenser as outlined under Problem (F). |
| | 5. Too frequent starting. | 5. It is difficult to establish the maximum number of starts per hour which will not trip out the protector since there are so many different types of load to which motors are applied. In general, however, too frequent starting may be a possible cause of trouble if the motor is starting 6 or more times per hour. If it is thought that this is the trouble, contact Wagner giving complete details. |
| | 6. Defective (motor mounted) protector. | 6. First be sure that steps No. 1, No. 2, No. 3, No. 4, and No. 5 have been checked and remedied if necessary; they probably will have rectified the trouble. But if the application is still unsatisfactory, record each of the "on" times of the motor for 10 successive attempts to start. If two or more of these "on" times are less than 2 seconds for types RB and RB-5 (GB), or 3 seconds for type RK (RBZ), replace the protector with a new unit of the rating called for on the motor nameplate. Operate the motor on the appliance under actual load conditions. If the application is still unsatisfactory, transmit *all* the information obtained to Wagner. |
| (H) PROTECTOR (motor mounted) trips after the motor has come up to speed. | 1. Low voltage. | 1. See G-1. |
| | 2. Excessive room temperature. | 2. The current input to the motor, which the protector will allow continuously without tripping, decreases 1/2 to 1% for every degree Centigrade of room temperature above 40° C. (For room temperatures below 40° C the continuous input current which the protector will allow is increased by approximately the same amount.) Therefore, the allowable load as determined by step No. 3 (below) should be corrected for room temperature *at the motor*. |
| | 3. Excessive load. | 3. The protector on standard Fractional Horsepower, General Purpose, Open Type motors is designd to allow the motor to carry at least 140% of full load horsepower in a room temperature of 40° C; the current input at this load is approximately 125% of the nameplate current. Take an ammeter reading. If the current drawn exceeds the 125% of full load value refer the trouble with complete details to Wagner. |
| | 4. Too frequent starting. | 4. See G-5. |
| | 5. Defective (motor mounted) protector. | 5. First be sure that steps No. 1, No. 2, No. 3, and No. 4 have been checked and remedied if necessary. Look at the protector; if it is obvious that it is physically damaged (for example, cracked or broken bakelite) replace it with a new protector of the same rating as called for on the motor nameplate.<br>If, after a complete investigation as outlined in the various steps above, the trouble has not been found, refer the matter to Wagner with *all* the information obtained. |

# COMMERCIAL

**INCREASE BUSINESS BY DOING A MORE EFFECTIVE JOB OF SELLING** *Selling*

# Two Dollar "Inspection Call" Builds Service Income for Dallas Firm

*By Robert Latimer*

THREE types of promotional campaigns built around a two-dollar inspection call have proven the most profitable means of conducting a refrigeration service and appliance repair business for Boedeker's, large appliance dealership operated by Burton Holt at Dallas, Tex.

Holt, who formerly operated an appliance business selling upwards of 250 new refrigerators a year "waded into" service as a brand new field, one which he realized would take the same careful management as appliance merchandising. Though the store has been transformed into a machine shop, and the six former salesmen replaced by appliance mechanics, Boedeker's is still "selling"—but in this case merchandising good repair service instead of actual appliances. Only one salesman is left, to handle occasional trade-ins and reconditioned refrigerators, but even he spends most of his time at work in the shop. Overhead has been cut to a minimum, advertising switched from newspapers to the telephone and direct mail, and other economies effected to compensate for war conditions.

"We look at appliance service as a definite promotional field," Holt explains, "and as the basis for the selling field we intend to enter after the war. Our sales methods are aimed at developing profitable service work first, and making new-appliance customers for us later on. Both ideas influenced our methods, of course, and we are as careful not to offend the service customer as we would be with one about to spend $600 for new appliance. Holt feels that the former appliance dealer straggling along on a reduced income through service work is likely to grow careless of his customers' feelings, and thus impair his chances of selling them when merchandise is again in stock.

## Campaigns Are "Tailored"

The three campaigns run by Holt are carefully "tailored" to this theme. First, there is a continuous telephone-canvassing program aimed at all housewives in a selected neighborhood. Holt and H. R. Livingston, formerly sales supervisor, make all calls, telephoning the housewife

## It's Time to Tell About Refrigeration's "*Hidden Services*"

# .. take *VEGETABLES* *for instance..*

## America's Vitamin Foods

The snow may be deep outside, but in food stores across the nation the housewife always has a large selection of fresh vegetables awaiting her choice. . . . Crisp lettuce, celery, carrots, peas, beans, and all the rest of the vitamin-rich foods so important to healthful, vigorous living.

Fresh Vegetables in February, hundreds of miles away from their "sunny South" gardens, are possible only because of the miracle of modern Refrigeration started in Fast Freezing Plants, and Cold Storage Plants close to

dreds of miles away from their "sunny South" gardens, are possible only because of the miracle of modern Refriger-
Refrigeration started in Fast Freezing Plants, and Cold Storage Plants close to the southern gardens.

Some of these vegetables started their long trip to northern markets packed in crushed ice made mechanically, others in "meal size" fast frozen packages. Protected by carefully controlled temperatures of Refrigerated Railroad Cars, they arrive days later for safe storage — again — in the Cold Storage rooms of Wholesale Fruit and Vegetable Distributors. . . . Thousands of dollars worth of modern refrigeration equipment operates day and night to bring these "Vitamin Foods" to the War Worker's Wife practically garden-fresh.

All along the route from garden to dinner table, A-P DEPENDABLE REFRIGERANT VALVES are doing their part to protect "America's Vitamin Foods." Today, when Mechanical Refrigeration Equipment is asked to work harder, operate longer, and with little or no repair and replacement expense, the proven dependability of A-P Refrigeration Valves is helping vegetable packers, shippers, wholesalers, and retailers maintain smooth, efficient distribution. Food is ammunition. True! But ammunition for U. S. *only* if it is kept fresh.

Model 204

Model 205

Model 215

AUTOMATIC PRODUCTS COMPANY
2454 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN
Export Department
100 Varick Street . . New York City

AP DEPENDABLE Refrigerant Valves

and offering a ten-point "inspection" at the modest price of $2.00 which will uncover any possibility of future breakdowns, and assure continued efficiency.

### Points Offer Sales Pointers

The ten points include checking of the compressor, examination of coils, expansion valve, motor, wiring, fluid, etc., with gasket tightening, oiling, and adjusting of every moving part. These are each carefully explained to the prospect with the emphasis on shortage of parts and experienced repairmen. No "high pressure" has been used; nevertheless, Boedeker's has been successful in selling the inspection call to more than 50 percent of the prospects contacted. Once inside the home, of course, any service needs detected can be easily sold, and the customer is not frightened away by the fear of high prices.

The same two-dollar check is offered by a rotating direct mail plan. Under this system, every appliance owner in the city is contacted every three months by mail, offering inspection at an appointed time. The well-written letter simply offers an excellent safeguard against later trouble with the inspection service, and invites the customer to make use of Boedeker's excellent equipment and repair staff.

### Complete File Is Kept

Lastly, a file is kept on every home visited, or on every appliance serviced—giving concrete data about condition and expected life, with an estimated date as to when service will be required again. These cards are kept arranged so that they appear automatically near the service date—when the owner is telephoned and the inspection call offered—possibly for the second or third time. Good work in estimating the life of this and that part has made it possible to "hit it on the nose" in many instances; the appliance beginning to give trouble just about the time Mr. Holt calls the owner.

"We concentrate at all times on giving the impression that our job is to help the homeowner get by with his present appliances until we can provide him with new refrigeration, etc.," Mr. Holt summed up. "The $2.00 inspection plan gets us into many homes we would not visit otherwise, and gives an excellent basis for later sales relations."

S S S

## DRUGGISTS GOOD CUSTOMERS FOR REFRIGERATION EQUIPMENT

DESPITE their inability to continue their former outlays for the purchase of new refrigeration and air conditioning equipment because of its unavailability, retail druggists comprise a broadening field for service, according to estimates revealed in an annual year-end survey by *Drug Topics*, the retail drug trade's national weekly newspaper.

A total of $1,197,348 was spent by druggists on new prescription and fountain department refrigeration equipment during 1942, of which $1,011,236 was spent by independent stores and $186,112 by chains, the survey estimated. This compared with similar 1941 expenditures totaling $1,903,498, of which $1,706,145 came from independents and $197,353 from chains.

The survey also covered service expenditures for the first time because of their increasing wartime importance. It was estimated that the druggists of the nation spent a total of $565,454 on servicing of refrigeration equipment, with the independents spending $308,772 and the chains $256,682. The independents spent an additional $22,021 for ice cream freezer servicing and the chains spent $18,284 for a total of $35,305. For servicing of air conditioning equipment the druggists spent an estimated total of $361,480, of which $307,195 came from chains and $54,285 from independents.

Stressing the importance of service to its readers, the drug trade paper stated: "Because of the unavailability of most new equipment, the minute a druggist finds anything wrong with what he has, he should immediately call in an expert to make repairs. If he waits too long to do so, he may find that the equipment is too far gone or that, if the equipment can be repaired at all, it now requires more labor and time than it would have required earlier."

S S S

P. H. Doyle,
Chicago, Ill.

"Don't ever stop this journal."

## THE STANDARD OF *Enduring Craftsmanship*

It was seldom that Stradivari, most famous of violin makers, was able to make more than one violin a year. But he brought his craft to the highest pitch of perfection and his methods created a standard unchallenged ever since.

*In these days of speedy mass production it still takes more than a formula to make a product outstanding. Skill and craftsmanship throughout every department are the "plus values" in Virginia products.*

**VIRGINIA—A NAME THAT HAS EARNED RESPECT**

"VIRGINIA" REFRIGERANTS
AGENTS FOR KINETIC'S "FREON-12"
VIRGINIA SMELTING CO.
WEST NORFOLK, VIRGINIA

# Questions and Answers

## On Interpretations and Rulings on Government Orders Covering Refrigeration Sales and Service Business

THE widespread interest in Government regulations pertaining to preference ratings on material for emergency repair servicing, and prices that may be charged for sales and service in the refrigeration service business, has encouraged THE REFRIGERATION SERVICE ENGINEER to inaugurate a new service. While we are not able to provide official answers in this new department, individual problems on the applications and interpretation of the above regulations will be explained to the best of our ability, pending an official ruling from Washington.

### PURCHASE OF TOOLS AND OTHER MATERIALS

**QUESTION 1: Under Preference Rating P-126, can tools be purchased using AA-4 rating? Can carbon tetrochloride, for cleaning purposes, be purchased under this preference rating? Can copper tubing, for ordinary repair use, be purchased using P-126 ratings under the M-9-c order?—J. J. G.**

ANSWER: Tools can be purchased by a Certified Emergency Service Agency under rating applying to the jobs serviced under Classes I, II and III, because the preference ratings are assigned to deliveries of *material* for emergency repair service, and material by definition means "any commodity, equipment, accessory . . . or product to be used in connection with emergency repair service." Be sure, however, that they are tools specifically required for rendering "emergency repair service" to systems covered by the Order.

According to P-126, paragraph d-2, the Order may *not* be used to secure any material "to render any repair service which is not emergency repair service as defined in the Order." Each question should be considered from this standpoint. Supplies and materials for general shop or service use may not be purchased with priorities extended in the Order.

The answer to questions two and three is "No" for general use, but it is "Yes" for specific use in "emergency repair service."

### RESTRICTIONS ON MATERIAL

**QUESTION 2: Relative to the D section of the P-126 Order as amended, my impression is that the restricted items shown in this paragraph pertain to obtaining material for new or increasing the capacity of an existing system. In discussing this with several independent servicemen they are of the opinion that the items mentioned are restricted even on repair jobs. We would appreciate having your opinion relative to the paragraph.—S. M.**

ANSWER: The exclusions listed under paragraph d-4 apply to "any 'new' system or for expansion of existing facilities or for non-emergency replacement." Subject to such limitation as any other orders may impose (paragraph f) a certified emergency service agency may procure these materials under P-126 for emergency repair service as defined in the Order.

### PRIORITY RATING FOR SPARE TIME

**QUESTION 3: I would like to know the procedure to get Priority Rating for commercial and domestic work which is done in spare time.—E. E.**

ANSWER: There is no special priority rating extended for general commercial and domestic refrigeration servicing. If some hospitals, packing houses, commercial food processors, retail food stores, refrigerated trucking organizations transporting food, or farmers operating milk coolers will designate you as their emergency service agency, you can file Form PD-399 for a certificate under P-126 and request an inventory allotment under paragraph (e) of the Order.

### SELLING PRICE FOR NEW DEALER

**QUESTION 4: I wasn't selling refrigerators in March, 1942. How can I tell what to charge now under OPA regulations?—R.H.P.**

ANSWER: Go to your nearest competitor, nearest to you not just in miles but in the

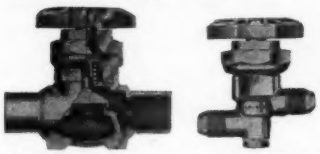
# *Superior* PRODUCTS ★ ★ ★

## ★ ★ ★ FOR YOUR *Defense* JOBS

Increased refrigerated space for the accelerated production of perishable foods places a heavy responsibility upon the refrigeration industry. Shortage of metals condemns waste and inefficiency. Do your part to conserve materials. Design to produce more refrigeration per watt hour. Select equipment which requires a minimum of service. Specify SUPERIOR — the quality buy-word of the industry.

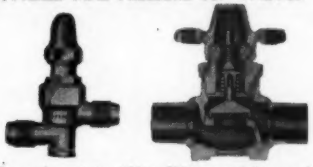
CUT OUT AND SAVE FOR FUTURE REFERENCE

### DIAPHRAGM PACKLESS VALVES



Entire internal assembly removable for soldering or inspection. Equipped with famous pressure cup below diaphragm. Two and three way. Flare sizes ¼" to ¾"; Sweat sizes ¼" to ⅞".

### PACKED AND PRESSURE CUP VALVES



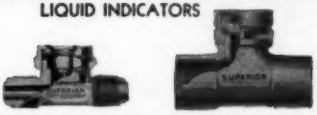
Flare and sweat sizes ¼" to ⅝" (two and three way) have hex seal cap. Sweat sizes ¼" to 2⅛" (globe) have wing nut seal cap. Internal assembly (all sizes) removable for sweating to valve body.

★ *Refrigeration is Vitally Essential to Our National Defense Efforts* ★

### CHECK VALVES

Very sensitive springs. Less than 5 ounces pressure drop. Positively will not chatter or hum. All internal parts easily removable for sweating or inspection. Sizes ¼" to ¾" Flare; ¼" to ⅜" Sweat.

### LIQUID INDICATORS



With or without seal cap. Flare sizes ¼" to ⅝"; Sweat sizes ¼" to 1⅜". On ½" Sweat to 1⅜" entire upper assembly may be removed as a unit to facilitate soldering of refrigerant lines to connections.

★ *Refrigeration-Food Preservation and National Defense are Synonomous* ★

### DEHYDRATORS

Silica-Gel or Activated Alumina. Refillable and non-refillable. ¼" to ⅜"; ¼ to 5 H.P.; 2 to 60 cubic inches.

### MANIFOLDS

With packless or seal cap valves. Two to six valves; ¼" to 2⅛" valves, with or without end fittings. Sweat or flare.

### FILTERS

Highly efficient sock type filter. Sizes ½" SAE to ⅝" SAE. One to five horsepower.

★ *Don't take chances with the Nation's Health -- do the best job possible* ★

### FITTINGS

Unions, adapters, elbows, tees, crosses, caps, etc. ⅛" through 1".

### HEAT EXCHANGERS

Unique design gives highest capacity per unit size. Sweat or flare connections. 4200 to 9725 BTU per hour.

Combination Heat Exchanger and Accumulator. From one to ten tons. Especially recommended for low temperature installations.

### FLARE NUTS

Brass and steel. Long and frost proof. Forged and bar stock.

★ For complete details—see your Jobber or write for catalog ★

## SUPERIOR VALVE & FITTINGS CO.

★ PITTSBURGH ★ PENNSYLVANIA ★

makes and sizes of the boxes he sells, and get the price list he is allowed. If for any reason he doesn't want to cooperate, call your regional OPA office and they will advise him. Your biggest function now is one of supplying merchandise and service to your neighborhood, and you can do it less expensively than a dealer farther away. We believe the Government will cooperate with you in this.

### PERSONAL REFRIGERATOR SALE

**QUESTION 5: Can a man personally owning a refrigerator sell it for any price he can get?—R. H. P.**

ANSWER: Under Maximum Price Regulation No. 139, "no person shall sell or deliver a used household mechanical refrigerator . . . at prices higher than the maximum prices set forth in Appendix A" (of this order). This would indicate that the answer to this question is "No," an individual being restricted the same as a dealer.

### FLAT REPAIR ESTIMATES

**QUESTION 6: Are there any restrictions now on making flat repair estimates?—R. H. P.**

ANSWER: If you did in March 1942, yes. If you offered free estimates throughout that month, you're held to it now. In that case, if you take a refrigerator apart, locate the trouble, give your customer an estimate on the repair job necessary, and he refuses it, all you can do is put it back together again without charge. Your best bet is to ask him to leave it with you, unassembled, while he shops around for a better price. If he doesn't find one, you can go through with the repairs. If you've always charged for making an estimate on the tougher jobs that can't be accurately guessed at, you have nothing to worry about from OPA regulations on making estimates.

### APPLYING FOR RATING

**QUESTION 7: Would you advise a service man to apply for a rating under P-126 even though he works for a dealer who has a license?—C. H.**

ANSWER: No, it is not necessary for a serviceman to apply for a rating under Order P-126 if he works for a dealer who has a license certificate. It is sufficient that the dealer has one and the employee can get all possible preference ratings through that fact.

### RATINGS AVAILABLE

**QUESTION 8: What is the highest rating I can procure for repair and service materials? I service units at various defense plants, retail stores, restaurants and home units.—W. T.**

ANSWER: Under Preference Rating Order P-126 as amended, the highest rating you can obtain for servicing units at defense plants is AA-2X, and for retail food stores and restaurants, AA-4 after you have been certified under the order. Home units are not covered, neither by the amended nor the original order, but you may purchase such repair parts from your distributor without a preference rating. He then may replace these parts sold from inventory through preference ratings assigned on his PD-1X form.

### FACTORY PRICES

**QUESTION 9: I have a parts catalog, but I can't always get parts from the factory. Now, where I can make a part for a customer, or get it made, can I charge him what it costs me, or can I charge him only what the catalog says?—R. H. P.**

ANSWER: The company can charge you only what it did in March 1942, and that's all you can charge your customer, no matter where the part comes from. At least, that's what the OPA ruling says now. In a case like this write down the specific facts and send them in to your regional OPA office with request for a favorable ruling. Until then, it's safer just not to take the job.

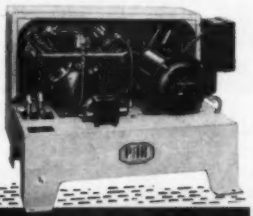
### TRADE-IN PRICES

**QUESTION 10: What about trade-ins? Some time ago I allowed $50 for a refrigerator four years old. It will cost me $25 to repair and rebuild it, but the OPA won't let me sell it for $75.—R. H. P.**

ANSWER: The trouble there is that the trade-in figures you used to allow were just a way to make a cut-price offer and still stay within the manufacturer's price listing for the sale of his boxes. All you can do is pull the best deal you can out of your OPA price list and rebuilt price maximums. They probably won't help you much, because in March 1942 you were selling that box second-hand for a lot less than $75. What you sold it for then is going to be your present sale price. Your only consolation is that in the future you won't have to offer the trade-in figures that you did in March 1942.

# Emphasis on Education

Today . . . in civilian life and in the services . . . the emphasis is on specialized industrial training and education. As a result, in tomorrow's peace, more people than ever will be equipped to judge keenly the merits of mechanical products. This means the future market will quickly recognize equipment of superior performance . . . products that have kept pace with new developments. PAR Condensing Units have always met the requirements of the most exacting buyers . . . will continue to do so in the world of tomorrow where appreciation of outstanding craftsmanship will be keener than ever.



*Manufacturers of*
*PAR Commercial Refrigeration Equipment*

PAR
DIVISION

LYNCH MANUFACTURING CORPORATION · DEFIANCE OHIO U S A

# The Question Box

**Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."**

## RUSS FOUNTAIN OIL CLOGS

**QUESTION 539: I wonder if you could help me out. I have been trying to get a soda fountain to work and have not been very successful so far. It is a Russ fountain, about 10 or 12 years old, $SO_2$ with two low side floats—one in sweet water bath and one in ice cream section.**

**About three years ago, the dealer began to have a lot of trouble with oil clogging up in both boilers. The service man who was doing his work then took the whole top of the fountain off and took the boilers out and cleaned all the oil out of them. He then completely rebuilt the compressor, and put two new float valves in the boilers. The fountain worked very well for about a year and then stopped again. The same fellow drained the oil out of both floats again, but did not put in new floats, or bother with the compressor. The fountain again worked for almost a year, and then began to act up again. The dealer called me in this time. I took out the float valves and pumped all the extra oil out with a suction hand pump I have, and then persuaded the dealer that he should put an oil separator on his compression unit.**

**I had to wait almost three weeks before I could get a separator due to the war and priority difficulties, but finally did get it on. In the meantime, while I was waiting for the separator, the compressor ran dry of oil, and I had to put in enough to keep the crank case level full. When I put the separator on, I did not drain the oil out of the floats because I believed that the separator would gradually get it out by not allowing any to get by it. The fountain has worked good for about three months, and is acting up again. The motor runs most of the time, and the ice cream is just a little bit too soft to be handled.**

**Since the separator has been in operation, I have been back twice and drained some oil out of the crank case—about ¼ to ¾ gal. in all. The separator oil return line to compressor crank case stays cold all of the time due to the fact that the float in the separator does not remain closed more than a few seconds. Consequently, the pressure in the crank case runs from 5 inches to 16 inches up and down all of the time. I took the oil separator off and turned it upside down thinking that maybe it had too much oil in it, but could not get hardly any out of it. Do you hink that the oil separator could be faulty already? It is a Frigidaire rated at one horsepower and the compressor is only ¾ horsepower.**

**Do you think a check valve in line from the ice cream float and boiler would help to keep the cream harder? Maybe I should take out the floats and drain the oil again? At least I would know how much was in the boilers. What do you think?**

ANSWER: Nine times out of ten the cause of floats becoming oil clogged is a lack of refrigerant. This is more or less true of all flooded systems, because a lack of refrigerant in the system permits the oil to be held in the evaporator where it tends to fill up the space which should be occupied by refrigerant. When the refrigerant level becomes low in the evaporator, it is natural that oil will attempt to fill up this space.

It may be that your present trouble is then due to insufficient refrigerant, and I certainly think that if more refrigerant were added, you would have no trouble in getting the oil to return. For this reason, it should not be necessary to again dismantle the boilers in order to remove the oil. Adding refrigerant should force this oil to return.

There are other possibilities of trouble, one of which is that the oil viscosity is too high. Very often you will find that a high viscosity oil has been used in low temperature work, where it has a tendency to congeal and is difficult to return. A 75 viscosity oil is about right for this type of work.

Another possibility is that the floats are out of calibration, which may be cutting off the flow of refrigerant to the evaporator before it has reached its proper height or which may be calibrated so high that it permits refrigerant to splash over into the return line causing the return line to sweat or frost.

The fact that the oil separator float opens so often indicates that a lot of liquid is be-

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VALVES

*before-*
*during-*
*after-*

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ing returned and is passing through the compressor. If the system is in normal condition, the float in the oil separator should not open often enough to create a fluctuation of suction pressures. In fact, it is very probable that this fluctuation of pressure is not due to the float in the separator at all, but may be due to the fact that there is insufficient liquid or refrigerant passing into the evaporator floats to cause them to close off tightly and that vapor refrigerant from the condenser is being admitted to the evaporators. There again, the addition of refrigerant would overcome the trouble. I don't think a check valve would be of value in this system since a check valve is for preventing migration of refrigerant from one evaporator to another. There is no reason to believe this is happening here.

## GRUNOW ERRATIC

**QUESTION 540: What are the ill effects, if any, upon using a hydrous methyl alcohol in Carrene refrigerant, to prevent what seemingly is moisture that causes the coil to be starved of refrigerant, and results in no refrigeration with the unit still running. And when the machine is left off for a while, then turned on, the evaporator will frost normally for about forty-eight hours. Or the ice cube tray can be filled with hot water and left in it for a short while and this will restore normal operation.**

**The check valve does not seem to be the cause for the trouble in this particular model using the horizontal unit.**

ANSWER: I don't believe there would be any more objection to using Methyl Alcohol in Carrene refrigerant than in Freon or Methyl Chloride. However, from the information you have given me, I am inclined to believe that moisture is not your trouble. I believe that the system is short of refrigerant which has permitted oil to be carried over from the compressor and trapped in the evaporator so that now the percentage of oil in the oil and refrigerant mixture in the evaporator is much too high. Adding refrigerant will cause the suction line to frost temporarily, but will also force the oil to return to the compressor where it will be trapped again, thus reducing the percentage of oil in the evaporator. The oil mixes thoroughly with Carrene refrigerant, and therefore, it would take some time to separate the two through this method.

In a sulphur dioxide system the problem is much simpler, because oil floats on top of the refrigerant and as soon as the system is overcharged the oil is returned first. Quite a quantity of the refrigerant will have to be circulated in a Carrene system before the oil can be expected to separate sufficiently.

## WESTINGHOUSE UNLOADER OPENS

**QUESTION 541: I am servicing a Westinghouse refrigerator, and the unloader in the compressor keeps spitting when it reaches 100 lbs. pressure. Can you advise me what causes this spitting?**

ANSWER: I am not quite sure that I know what you mean by the term spitting when it reaches 100 lbs. pressure, but I presume you mean that the unloader valve opens up brief periods allowing the gas to by-pass to the low side. 100 lb. pressure is too high for this unit to operate on, and in all probability, the unloader is not strong enough to hold the valve closed at those pressures. In other words, 100 lb. is sufficient to force the valve open and permit pressure to be by-passed to the low side.

From 60 to 90 lbs. pressure is about the maximum head pressure obtained in normal operation of a Westinghouse unit employing $SO_2$, and 100 lbs. pressure constitutes an overload which would very likely endanger the motor. Such pressures are all right for short periods of time while the unit is being tested, however, it is my opinion that the unloader will not remain closed at those pressures.

## WESTINGHOUSE FANS

**QUESTION 542: I recently brought a fan into the shop from a Westinghouse domestic refrigerator about eight or nine years old. When I connected it to 110-V, it would not run. Then I got another 3 wire lead fan from an old Grunow which may not have belonged on the Grunow as it had been junked, but it seemed to be identical with the Westinghouse fan, and an old time Westinghouse fan, but neither one would run on 110 volts. Then I bought a new fan from Westinghouse, which would not run on 100 volts either.**

**I have not installed the new fan yet, but I guess it is all right. What I cannot understand is that I have checked your information on Westinghouse (November, 1939), and as far as I can see, these fans should run on 110 volts either on or off of the job. If there is something tricky about this, I would surely like to know about it.**

# TEMPRITE *Oilrite*

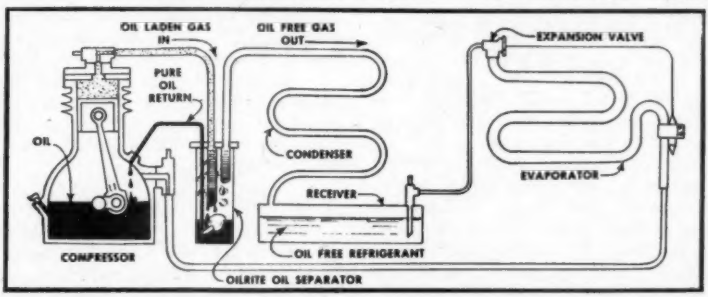
## AUTOMATIC OIL SEPARATOR

### *IMPROVES ALL REFRIGERATING SYSTEMS*

**Temprite has proven to the refrigerating industry that oil can be kept out of the low side evaporator coils with the use of their improved "Oilrite" Separators. This steps up the efficiency of all types of refrigeration lowsides by allowing the refrigerant to evaporate at its true boiling point and also eliminates the oil as a heat transfer insulator from the inside surface of the refrigerating lowside. In many LOW TEMPERATURE installations it is impossible to reach the desired temperatures during the peak season because of oil mixing with the refrigerant. The installation of an "Oilrite" quickly overcomes this difficulty and often results in 4 to 8 degrees lower temperatures in the evaporators without an increase in operating time.**

★ ***FEATURES*** ★

1. **Increases system capacity as much as 20%.**
2. **Reduces low temperature evaporators 4 to 8 degrees without increased operating time.**
3. **Permits refrigerant to evaporate at true boiling point.**
4. **Prevents dirt, scale and carbon entrained in oil from reaching and plugging strainers and valves —improved valve operation.**
5. **Provides constant oil level in compressor, eliminating worn seals, scored cylinders and bearings—adds years of efficiency to both old and new equipment.**




### HERE'S HOW IT WORKS

**Diagram above illustrates a refrigerating system showing the installation of an "Oilrite" oil separator. Note how the "Oilrite" permits all vital parts of the compressor to be lubricated and only starts to function when the oil leaves the compressor.**

**The "Oilrite" separates and collects the oil immediately after the oil has left the compressor and passes the pure separated oil back into the crank case of the compressor, thus allowing only pure, oil-free refrigerant gas to enter the condenser and receiver.**

★ ★

**DEALERS: It will pay you to investigate this improved "Oilrite" automatic oil separator. Send today for Bulletin No. R-5A describing this unit in detail. Prices will be sent upon request.**

**TEMPRITE PRODUCTS CORP.**

*Originators of Instantaneous Liquid Cooling Devices*

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ANSWER: I don't believe that the Westinghouse fan will run unless connected into its regular circuit in the unit. The operation of the electrical circuit in the Westinghouse unit is in part as follows: When the main contacts are closed, current flows through the service cable to the control post, then to the main contacts and the starting relay to the starting winding on the motor through the unloader coil. This opens the unloader valve permitting the motor to start with no load. The current passing through the starting relay coil decreases due to the resistance in the circuit allowing the relay armature to drop opening the contacts. This action decreases the current in the unloader coil and closes the unloader valve, at which time the motor has reached full speed.

The fan motor is a two-phase motor operated from the main motor windings. The fan motor will not start until the relay coil contacts or opens and the motor is up to full speed to generate two-phase energy. Possibly, if you could connect this motor to a two-phase circuit of low enough voltage, you would be able to operate it outside the unit, but it will not operate on single-phase 110 volt circuits.

## NEWS ON GOVERNMENT ORDERS

*(Continued from page 13)*

perature for cooled water from the customary 45 to 50 degrees to a maximum of 55 degrees is also recommended.

The use of mechanical, self-contained water coolers is held to be essential in (1) industrial plants and other establishments producing military or essential civilian supplies or services; (2) military and civilian hospitals; (3) military camps, bases, airfields, etc.; (4) foreign bases and for Lend-Lease export; (5) military and essential civilan activities in tropical climates.

Cooled drinking water in office buildings (both private and government), schools, and commercial establishments is considered desirable, but not essential, to the war effort. The Task Committee report therefore recommends that the use of mechanical self-contained water coolers be prohibited in such places for the duration, except by special permission of the War Production Board.

The need for cooled water and the practicality of installing mechanical coolers in each of the essential categories is pointed out in the report. In industrial plants, cooled water is held to be necessary to maintain efficiency and morale and to protect health. Installations should be available to replace worn out equipment, for expansion of existing plants and personnel, and for new construction. Military hospitals, both newly constructed and converted, can be equipped with cooled water with the minimum use of critical materials, the report states, by the installation of self-contained mechanical coolers. Requirements for civilian hospitals will probably be comparatively small, since few new civilian hospitals will be built for the duration.

Cooled water is held to be essential in military camps situated where the summers are hot, and such camps should be equipped throughout with mechanical water coolers; in other camps, such coolers should be installed in mess quarters and recreation centers as a health measure and to reduce the consumption of coffee, tea, and bottled beverages.

## COMPRESSOR BODIES

*(Continued from page 22)*

vapors and any oil which they may carry over are discharged into the oil float chamber attached to the side of the crankcase, where the oil is separated out and accumulates in this chamber.

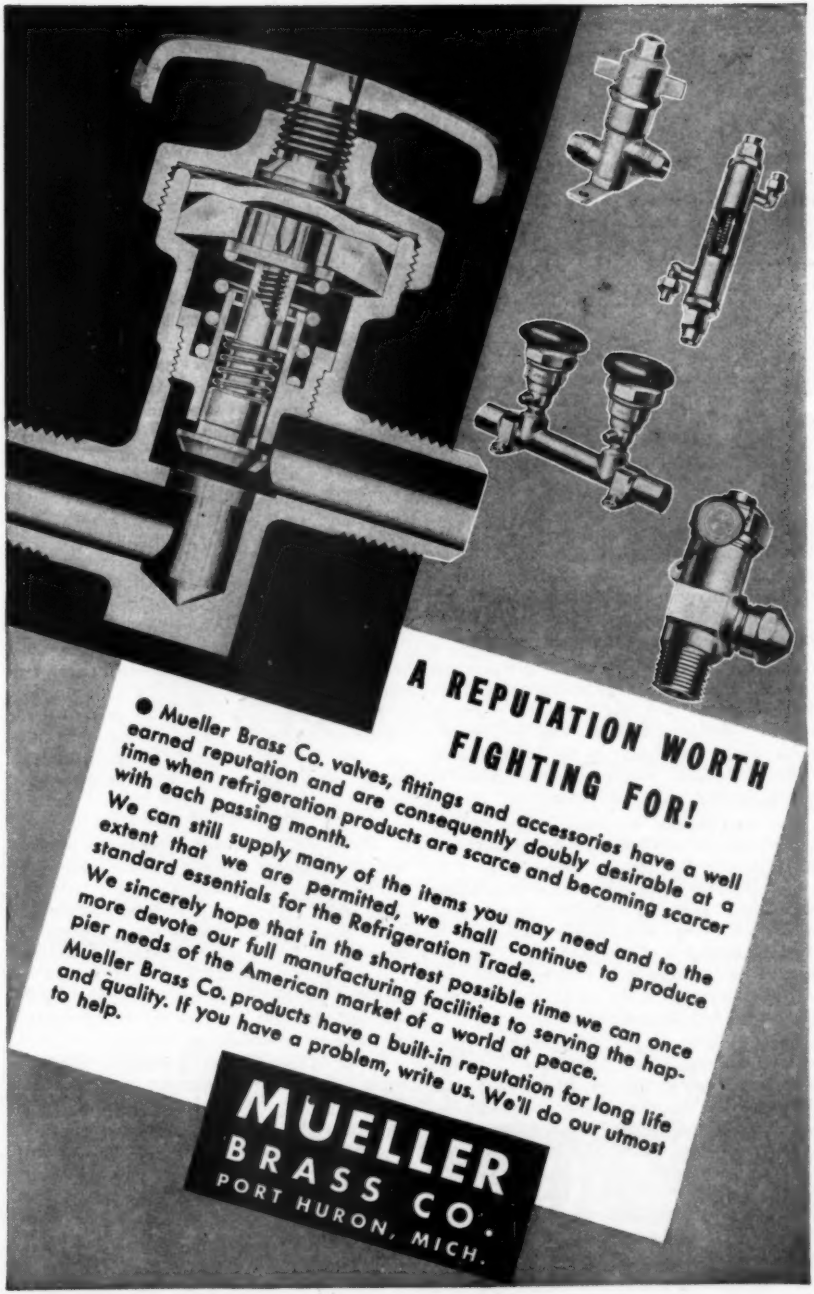
In the event that the compressor does not pump efficiently and it is evident there is a leak in it from high side to the low side, it may be that the oil float valve is not holding properly.

### Cylinder Head Assembly

Due to the fact that the head of the piston extends up into the bottom of the cylinder head and the clearance must be very close, it is imperative that the cylinder head is in proper alignment with the cylinder block. This alignment is obtained by the use of dowel pins, one being located on each end of the cylinder head.

The discharge valves are of the flapper type. Each cylinder has two discharge ports and consequently two sets of flapper valves are required. A raised lapped seat is provided at the upper end of the port, and the spring steel flapper valve makes contact on this seat. Tension is exerted against the flapper valve by steel springs and the entire assembly held in place by a bridge and two screws in the middle.

*(To be continued in April issue)*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We can still supply many of the items you may need and to the extent that we are permitted, we shall continue to produce standard essentials for the Refrigeration Trade.
We sincerely hope that in the shortest possible time we can once more devote our full manufacturing facilities to serving the happier needs of the American market of a world at peace.
Mueller Brass Co. products have a built-in reputation for long life and quality. If you have a problem, write us. We'll do our utmost to help.
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## REFRIGERATION INDUSTRY WARTIME CONFERENCE

STERLING F. SMITH, Chief, Refrigeration and Air Conditioning Section, General Industrial Equipment Division, War Production Board, will be one of the headline speakers at a Refrigeration Industry Wartime Conference which will be held April 13 and 14 in the Palmer House, Chicago. In addition to manufacturers, jobbers and service men, officials from the War Production Board, the Office of Price Administration and the Office of Civilian Supply have been invited.

The program for this conference was considered at a meeting held February 23 in the William Penn Hotel, Pittsburgh, Pa. It was decided to devote the conference largely to a discussion of availability of refrigeration parts and equipment and the present priority situation.

It was decided that all members of the industry would be invited to submit questions on shortages and priorities, which would be given to one or more committees of the industry so that the important questions could be determined and taken up with the manufacturers of the goods involved.

The extent to which the Refrigeration Service Engineers Society will participate in the conference and the complete program have not yet been decided, but will be announced in a bulletin from the International Office of R.S.E.S., which will reach members of the Society well in advance.

The opportunity to learn a few things regarding the availability of replacement parts during the coming summer, and to make plans for combating the serious problems which face the industry, is expected to attract a large and representative crowd from all branches of the business. The conference will be similar in nature to the successful gathering in the same spot on November 19 and 20 last year.

Those present at the Pittsburgh meeting were President A. H. Holcombe, Jr., and Secretary Fred B. Hovey, of the National Refrigeration Supply Jobbers Association, Secretary R. Kennedy Hanson, of the Refrigeration Equipment Manufacturers Association, G. E. Graff, Ranco, Inc., J. W. Krall, Detroit Lubricator Co., James A. Strachan, Weatherhead Co., Kenneth W. Newcum and John S. Forbes, Superior Valve & Fittings Co., H. S. McCloud, J. M. Oberc and J. W. Power, Acting Secy. R.S.E.S.

## TASK COMMITTEE MAKES REPORT

A TASK committee report was presented at a recent joint meeting of the Advisory Committee of the General Refrigeration and Air Conditioning Industry and the Heavy Machinery Segment of the Industrial Refrigeration Industry.

The committee is made up of the following: A. B. Schellenberg, Alco Valve Co., St. Louis, Mo.; F. S. McNeal, Universal Cooler Co., Marion, Ohio; and M. G. Munce, York Ice Machinery Corp., York, Pa.

The instructions issued to the committee, asked it to investigate the following questions with regard to refrigerating and air conditioning machinery and equipment:

1—(a) Whether adequate facilities remain available for the production and/or reconditioning of repair parts within the plants now producing such machinery. (b) Whether adequate facilities are still maintained for the production and/or reconditioning of such repair parts by plants which have withdrawn from the production of such machinery. (c) Whether there is any "bottleneck" in the production of any particular parts and if so, what is the cause.

2—The adequacy of the present facilities for distribution of such repair parts with regard to: (a) geographical coverage; (b) field inventories.

3—(a) The adequacy of the personnel remaining available for servicing such machinery and equipment with regard to: (a) geographical coverage; (b) field coverage.

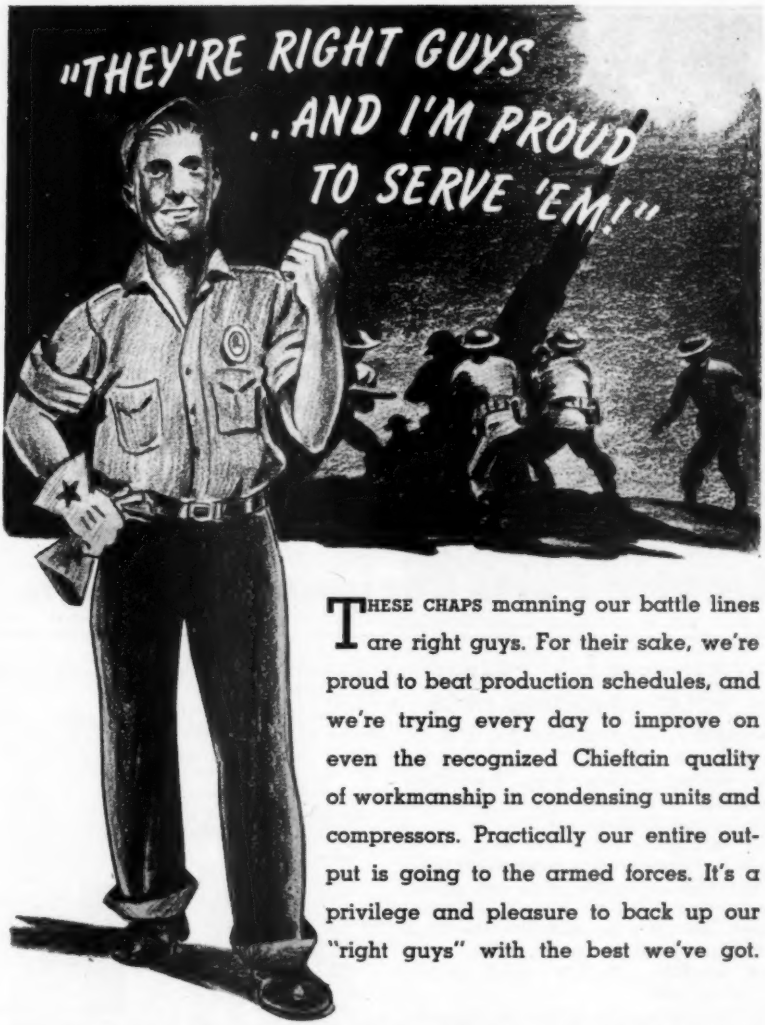
### Findings of Report

The findings show that there are serious delays in delivering repair parts because of difficulty in obtaining critical materials and that there already is a serious shortage of skilled service and repair men. Among the recommendations made were the following:

1—Higher preference ratings should be granted for materials for emergency servicing of industrial and commercial refrigerating and air conditioning systems.

2—A supply of raw materials should be made available immediately for repair and replacement parts to take care of emergency breakdowns.

3—A plan should be worked out to provide against possible widespread breakdown of refrigeration equipment in a given area. (Measures to be taken in such an emergency should include the granting of priorities on the use of refrigerated space and transportation and on service and repair labor.)




THESE CHAPS manning our battle lines are right guys. For their sake, we're proud to beat production schedules, and we're trying every day to improve on even the recognized Chieftain quality of workmanship in condensing units and compressors. Practically our entire output is going to the armed forces. It's a privilege and pleasure to back up our "right guys" with the best we've got.

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**FOR REPAIRING THE FOLLOWING:**

**HERMETIC AND OPEN TYPE UNITS**
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## DEALER CLEARED IN CHARGE OF VIOLATING CEILING PRICE

A SALE of a refrigerator last July by the Allen Appliance Co. of Omaha, Nebr., was not in violation of OPA ceiling prices, according to a ruling by Municipal Judge Dennis O'Brien.

Roy Dixon, who bought the refrigerator, had filed suit against the company, charging the sale violated ceiling prices and asking triple damages for the alleged difference between the price he paid and the OPA price. Dixon bought a nine-foot 1939 refrigerator for $250. The OPA price, he asserted, was $120.

At the hearing it was testified the $120 ceiling applies to "as is" refrigerators, generally second-hand refrigerators sold without guarantee. The cabinet sold by the Allen company, according to testimony of Joseph C. Brehm, one of the partners in the company, was a floor sample.

Regular price, it was testified, was $350. On new cabinets manufactured before 1941 the OPA ceiling is 70 per cent of the original price, Judge O'Brien said. On this basis, maximum for the box would have been $245, but Allen was entitled to trucking charges also. Thus, he said, the sale came within OPA ceilings.

"The purpose of this legislation," said Judge O'Brien, "was to protect the public, not to put a businessman out of business."

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1 to 150
(in hermetic units 1 to 300)

No dilution-of-refrigerant worries here. Manufacturers are charging it into new systems, right at the factory. Army and Navy are using it. Same formula as 5 years ago and made of the best materials. Remember . . . it both prevents and destroys moisture and neutralizes acid too. Get it . . . use it . . . appreciate it . . . now! 150 jobbers carry it.

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THAWZONE
Fully Protected by U. S. Patents
The PIONEER FLUID DEHYDRANT

# R.S.E.S. Chapter Notes

## TOLEDO CHAPTER

*December 9*—After a report of the treasury was given by the Treasurer, the annual election of officers got under way. Those elected were as follows: *President,* T. R. Riches; *Vice-President,* M. Lambert; *Secretary,* Fred Rudolph; *Sergeant-at-Arms,* A. LaFayette; *Board Members,* Chas. Huddason and H. Bennington.

After the election, some discussion arose concerning members now in the armed forces and families of deceased members. It was unanimously agreed that Chapter members should offer refrigeration service at cost to the families of these members and extend to them a helping hand wherever possible. A letter outlining this offer was sent to Mrs. Horvath and Mrs. E. Fry. The meeting was adjourned and refreshments were served.

*January 13*—The greater part of the evening was devoted to chapter business. Some time was devoted to discussion of local affairs such as the parking situation in the area and to the problem of moving equipment from Red Man's Hall to the present meeting place. Among new appointments was that of Paul Sizer to the *Chairmanship* of the Educational committee.

*February 10*—After President Riches submitted his report on the parking situation, a discussion arose on the probable working conditions after the war. The discussion proved interesting with several opinions being advanced.

Mr. Olenhauser of the W.P.B. gave a talk on rationing of tires and gasoline and answered many questions from the floor. Mr. Walbolt of the Office of Price Administration followed with a talk on price ceilings and also answered many questions.

## ONTARIO MAPLE LEAF CHAPTER

*February 12*—A nominating committee consisting of Gordon Burns, Harry Parrish, Bunny Frayne, Ted Smith and Arnold Olmstead was appointed early in the evening and instructed to draw up a slate of officers for consideration at the next meeting. Due notice was also given that the annual election of officers would take place at that time.

Considerable discussion concerning the Interprovincial Chapter took place at this

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meeting, and one of the questions raised was the possibility of quoting a $1.00 entrance fee to the Interprovincial Chapter which would be open to all members of local Chapters.

On the educational program, Mr. Wally Smallwood dealt with a questionnaire comprising fifteen questions. These questions were on various problems in refrigeration. Each member was given a typewritten sheet of the questions and each question was assigned a time limit. A very interesting discussion developed which was decidedly educational and instructive.

## MOUNT ROYAL CHAPTER

*December 7*—The annual election of officers took place at this meeting with the following results: *President,* Hector Millen; *First Vice-President,* J. M. Turner; *Recording Secretary,* J. A. St. Laurent; *Corresponding Secretary,* Arthur Brown; *Treasurer,* Philippe Tremblay; *Sergeant-at-Arms,* Geo. McGuirk; *Chairman — Educational Committee,* Gordon Roe; *Board of Directors,* B. Lacerte, R. McCullough, C. E. Fabien.

*February 5*—After disposing of the Chapter business for the evening, the meeting was thrown open to a general discussion of the new amendment to order P-126. President H. M. Milne discussed the details of the order answering many questions and clarifying its meaning.

*February 16*—A meeting of the Executive Committee was held on this date at the Roma Restaurant. A selection of regular meeting dates was one of the first items of business resulting in Tuesdays and Thursdays being unanimously chosen.

The future educational program mapped at this time provided for speakers to be supplied by the following: Frigidaire Products of Cana Limited—March; Railway Engineering Specialties Limited—April; Airco Refrigeration Parts Reg'd.—May; Laval Electric Reg'd.—June; Kelvinator Products of Canada Limited—October; C. I. L.—November; Motor Repair Limited—December.

## BOSTON CHAPTER

*February 9*—Three new applications for membership were received at this meeting and the members were welcomed to the Chapter. They were: Henry E. LaBarre; Chester A. Sherman; Hugo A. Cocce.

At the educational program for the evening, H. P. Hanspicker of Miller & Seddon Co. gave some pointers on servicing ice-cream freezers and hardening cabinets.

**MAINTAIN PRESENT EQUIPMENT *and* WE CAN HELP YOU!**

We ALWAYS have on hand, a complete stock of repair and replacement parts to assist you in keeping present equipment in good working order.

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## COLUMBUS CHAPTER

*February 10*—The first order of business in the evening was the annual election of officers which resulted in the following being elected: *President,* Burt Sayre; *First Vice-President,* Wm. H. Boye; *Second Vice-President,* Wayne Chaney; *Secretary-Treasurer,* Howard Grossman; *Sergeant-at-Arms,* Erwin Grace.

Several members of Columbus Chapter thanking R. B. Breneman. J. D. Merkle, Mr. Breneman, Howard Grossman, Carl Toothaker, H. L. Scott.

Carl Toothaker, retiring president Columbus Chapter, leads the refreshment line.

On the educational program, Mr. R. B. Breneman of the Armstrong Cork Co. showed a very interesting picture on the various phases of locker storage. Guests of the evening also included S. H. Zoellner, Serv. Mgr. of Dayton District, Frigidaire Corp., and I. H. Zoellner, U. S. Army Engineer. The meeting was well attended and the educational feature was informative.

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INDIVIDUALLY CALIBRATED COLD CONTROLS $2.00

### TRI-STATE CHAPTER

*February 23*—A meeting was held at the home of A. W. Gruber. The first order of business was the partaking of a sumptuous dinner at 6:30 p.m. This was considered the last of such meetings for the duration because point rationing will now make it impossible to serve such hearty meals to large groups. The regular Chapter meeting was held following the dinner and was called to order by President D. M. Young. The greatest part of the evening was devoted to discussions of the latest governmental rulings affecting refrigeration.

### INDIANAPOLIS CHAPTER

*January 26*—At this meeting, Noah Mohr was elected *Vice-President* to fill the vacancy created when Earl W. Thomas left to join the armed forces.

### INTERPROVINCIAL CHAPTER

INTERPROVINCIAL CHAPTER, R.S.E.S., will conduct a conference on March 14 and 15 in the King Edward Hotel, Toronto, and service men from all parts of Canada and a few from the United States will be in attendance.

Several prominent manufacturers of refrigeration parts will be present from the United States. President E. A. Plesskott and Acting Secretary J. W. Power will represent the International Office.

Ontario Maple Leaf Chapter, R.S.E.S., will hold its annual dance Monday evening, March 15, immediately following the conference. This has come to be one of the leading social events of the profession in Canada, and a large attendance from both local and distant points is expected. Tickets for this dance may be obtained from C. A. Kirkwood, Secretary of the Ontario Maple Leaf Chapter, 216 Westmount Ave., Toronto.

### CLEVELAND CHAPTER

*January 14*—A report of the Christmas party was given by Chairman of the committee, Glenn Keller, and everyone commented on the excellent food served at the party. The party was given at Marsh's Old Fashioned Boarding House where $25.00 in war savings stamps were given as prizes. There was also candy and presents for the kiddies.

During the business session of the evening, a nominating committee was appointed by the President to select candidates for office during 1943.

*February 11*—The anual election of officers took place on this date with the following results: *President,* George Baumgardner; *First Vice-President,* Glenn. Keller; *Second Vice-President,* J. Smylie; *Secretary,* J. A. Brown; *Treasurer,* R. D. Chown; *Sergeant-at-Arms,* George Schuld; *Board of Directors,* Warren W. Farr, Walter Wright, A. M. Fenwick, Ed. Vadakin and Glenn Gaskins; *Chairman—Educational Committee,* Elmer Wiedwald.

The installation of officers followed immediately after the election with the newly elected President in his acceptance speech pledging himself and his efforts to a 1943 banner year for the Chapter.

### MILE HIGH CHAPTER

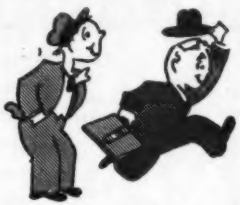
*February 8*—It was suggested by the members present that the Chapter should have a central credit organization where each member could report the credit status of his customers making this information available to all other members. Much discussion took place concerning this idea, and the members were cautioned that such a credit file may run afoul of the fair trades law. It was decided that legal advice should be secured before any such undertaking was attempted.

Mr. Olmstead of the Penn Electric Switch Company entertained the members with a film showing the construction and operation of Penn Avrgaire Controls. Bill Hemphill followed with a talk on the Psychological Approach of refrigeration service. He explained the various ways of approaching a customer and the do's and don'ts in the approach. Both of these talks proved highly interesting and created considerable discussion.

### CENTRAL CONNECTICUT CHAPTER

*January 25*—This was the annual meeting of the Chapter at which time the election of officers took place. Those elected, were as follows: *President,* James Felix; *First Vice-President,* Clarence Riedle; *Second Vice-President,* Timothy Moynihan; *Secretary,* Arthur Andreen; *Treasurer,* John Paar; *Education,* Joseph Simons; *Sergeant-at-Arms,* George Morin; *Board of Directors,* J. L. Wilkinson, Charles Bidwell and Leo Helinsky.

*February 11*—This meeting was held in the Empire Room of the Empire Restaurant. The newly elected officers were installed immediately following the annual banquet. One of the features of the eve-

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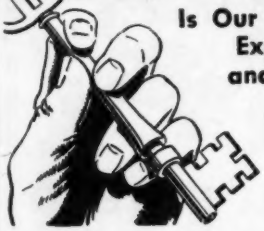

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REPAIR SERVICE

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ning was a review of the past season's activities, both social and business. These activities were outlined by Messrs. Wilkinson and J. Simons. For entertainment, Bateese from Canada, a NBC entertainer, kept the boys in stitches.

### COLONELS CHAPTER

*January 7*—A steak dinner preceded the meeting and everyone wondered where they got such big steaks. The annual election of officers followed with these results: *President,* E. J. Dicken; *Vice-President,* Carl Tapp; *Secretary-Treasurer,* H. C. Moore; *Sergeant-at-Arms,* Ray Atkinson; *Directors,* W. C. Hutchison, A. B. Dehler, Robert Riddel.

*February 4*—A meeting was held at the S.W.H. Supply Co. and the greater part of the time was devoted to the questionnaire on labor shortages and parts situation.

### TWIN CITIES CHAPTER

*February 2*—The greater part of the evening was spent in Chapter business and a discussion of order P-126. In order to obtain clarification of the revised order and priority regulations, George Klahn was appointed by President Ost as chairman of a committee whose duty it would be to familiarize themselves with these orders.

### LOS ANGELES CHAPTER

*February 24*—This was the fiftieth meeting of the Chapter and was held at Royal Palms Hotel. It was announced that John Roth, formerly with the Adams-Campbell Co. has entered the Coast Guard service.

John K. Roth presented a report of the dinner committee, stating that it may be necessary to eliminate the dinner from future monthly meetings due to the rationing of food. Pete Askew, chairman of the Priorities Committee, introduced A. H. Reinach, member of the Los Angeles War Production Board, who discussed the revised order P-126.

## *Ladies Auxiliary*

### TWIN CITIES AUXILIARY

*February 2*—A meeting was called to order by Mrs. Otto Chermak, Vice-President. After much discussion, a motion was made and passed that the President appoint a committee of six members each month who are to furnish entertainment and refreshments after the regular business meeting. One new member, Mrs. Donald Frank, was welcomed.

## CONTROLLED TEMPERATURES FOR X-RAY FILMS

INCREASING use of industrial X-Ray machines for flaw detection and inspection of war production materials centers attention on the model 555-PD refrigerating unit now being marketed by Temprite Products Corp., 45 Piquette Ave., Detroit.

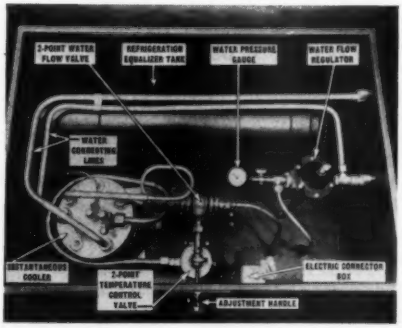


**Fig. 1—Refrigerating unit for controlling temperatures of developing solutions.**

To take X-Ray film photographs on a production basis, the company points out, extremely accurate limits have to be maintained on three major points: (1) Immersion time; (2) solution strength, and (3) solution temperature.

While the first two are at the discretion of the equipment operator, the third depends entirely upon conditions under which the equipment is used and may vary from day to day or hour to hour. Lack of uniformity in the "solution temperature" may nullify the first two factors and result in unsatisfactory prints.

To eliminate this variable hazard, the company has designed Temprite model 555-PD to circulate large quantities of controlled temperature water (at the recommended 65° F.) around the processing solution containers in the development tank. At the same time, according to the company, a large volume of clean controlled temperature water for washing the film or plates is always available because all used water is drained off and not recirculated.

One unique feature claimed for this model is that the waste water contacts the fresh water inlet coil, thus pre-cooling it and permitting the use of much smaller refrigeration equipment on high capacity installations.


★ HOW TO GET BUSINESS Today! ★

EVEN though civilian production of refrigeration has been curtailed, this industry's products are still being manufactured in a steadily increasing volume, for they are essential to our war effort . . . and this means there is a growing need for SERVICE.

Wherever Cold Plates are used there is service business for you . . . go after it in the following:

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Ally yourself with the Industry program of CONSERVATION.
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| 8 Ounce Size | 1.75 |
| 1 Pint Size | 3.00 |
| 1 Quart Size | 5.00 |
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**Cold Controls • Pressure Switches**
**One year guarantee on all repairs**
**Original Factory Specifications**
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**4011 Helldale Ave., Los Angeles, Calif.**


Distribution is being handled through existing dealer and jobber organizations, it is announced, and installations are now being made in plants requiring equipment adequate for the heavy loads and unusual conditions imposed by industrial X-Ray processing installations.

## N. Y. CONTROL OFFERS REPAIR SERVICE ON DEHYDRATORS

DUE to the restrictions of the W.P.B. on the use of copper and other critical metals essential to produce a new dehydrator the N. Y. Control Company, 534 Courtlandt Ave., New York, N. Y., decided that it is only proper to rebuild the old one.

The procedure employed is as follows: The old dehydrator is unsoldered, completely disassembled. The old drying agent, felts, screens and metal wool is discarded. The shell is cleaned with a degreasing non-inflammable quick evaporating fluid, then baked in an oven about 250 degrees F. to evaporate any possible moisture contents. New Davison Silica Gel is used to refill the dehydrator; new 100 mesh copper screen secured to both ends of each flange. New steel wool is used between the Silica Gel and the screen at each end to prevent against backing up to the high side. Each dehydrator is polished and tested under 150 lbs. pressure for leaks. Labeled decalcomanias with arrow pointing the direction "in and out" and reads "Charged with Davison Silica Gel." Each dehydrator is sealed at both ends with caps.

## RUTHENBURG HEADS COMMITTEE FOR ECONOMIC DEVELOPMENT

Louis Ruthenburg, president of Servel, Inc., Evansville, Ind., has been appointed Indiana State Chairman of the Committee for Economic Development. The appointment was announced by Paul G. Hoffman, president of Studebaker Corporation, South Bend, Ind., who is serving as national chairman of the committee.

The purpose of the committee is to lay ground work for postwar employment by private industry. The committee, Mr. Hoffman said, is not a government agency, although it was created at the suggestion of Jesse H. Jones, Secretary of Commerce, and is working with the Department of Commerce and other government agencies.

## BUILDING REFRIGERATORS FOR THE NAVY

PRODUCTION of a refrigerator that comes up to the requirements of the United States Navy doubtless is more difficult than most people realize. It must be built to furnish service in a variety of places, under many different conditions. For instance, it must be portable, and it must function even on a desert island where no electric power is available.

The Weber Showcase & Fixture Co. of Los Angeles, Calif., is producing refrigerators for the Navy which meet all these requirements. If no electricity is available, they have equipment to make their own. The illustration on the cover of this issue shows a phase in the manufacture of these refrigerators.

## HAL McPHERSON, CHIEF ENGINEER

THE HENRY VALVE COMPANY announces the appointment of Hal McPherson as chief engineer. Mr. McPherson has been associated with the refrigeration and air conditioning industry for over twenty years, and has been responsible for a number of important developments in the industry. He has been active and has held local and national offices in the American Society of Refrigerating Engineers for a number of years.

Hal McPherson, Chicago, Ill.

A considerable portion of Mr. McPherson's time is now being devoted to the development of a number of new accounts, which the company expects to introduce after the war.

Dayton

V-BELTS

FOR ALL LEADING MAKES OF HOUSEHOLD APPLIANCES

In the interest of conservation, see that Victory Vital V-Belts are properly installed with rust-free pulleys in correct alignment and with proper belt tension.

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THE WORLD'S LARGEST MANUFACTURER OF V-BELTS
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GET READY FOR THE RUSH!
HOOK UP NOW WITH A JOBBER WHO IS DEPENDABLE

WITH warm weather the going will become really tough. Fewer men, you know, to do more work. But with a good, dependable jobber to furnish replacements and materials, much of your problem will be solved. Make your arrangements **now.**

AS ALWAYS **DEPEND on BLYTHE**

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**EXPANSION VALVES**

**Rebuilt or Exchanged**

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| Automatic (any make) | $1.25 |
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**COLD CONTROLS**

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| Domestic | $2.00 |
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For the PERMANENT REPLACEMENT of STRATEGIC MATERIALS

CHEMICALLY RESISTANT TUBING AND FITTINGS BY

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Saran Tubing by Hodgman is a tough thermoplastic specially made to replace strategic materials such as aluminum, stainless steel, nickel, copper, brass, tin and rubber. It is adaptable for use under high working and bursting pressures and is resistant to most chemicals. Its insulating qualities, flexibility and ease of handling make it extremely valuable in installations requiring the transport of oil, gas, air, water and corrosive chemicals . . . Flare type fittings of the same material make it possible to install a complete system with no more tools than a sharp knife and a flaring tool.

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GASKETS—SPEED VICTORY

*Write for complete catalog.*

• Until Victory is won, war orders come first. Today, our gasket service for every refrigeration need is helping speed war production. Under these conditions, delays in filling other orders are unavoidable.

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7701 Avalon Ave. Chicago, Illinois

## WEATHERHEAD ANNOUNCES TWO NEW APPOINTMENTS

James A. Strachan has been appointed sales manager of the refrigeration division of The Weatherhead Company, according to a recent announcement by A. J. Weatherhead, Jr., company president.

Formerly sales manager of The Kerotest Manufacturing Company of Pittsburgh with whom he was associated for 14 years, Mr. Strachan is well known among refrigeration manufacturers and jobbers. He is also a director of the Refrigerator Equipment Manufacturers Association.

James A. Strachan, Cleveland, Ohio

Gene P. Robers has been appointed advertising manager of the Company according to a later announcement by Mr. Weatherhead. Mr. Robers succeeds Robert H. Weatherhead who has left the company to join the armed services.

Mr. Robers was formerly advertising manager of the Atlas Car and Manufacturing Company of Cleveland, and previous to that he was the owner of his own industrial advertising agency. He has had 11 years of industrial advertising experience and is well known in Ohio advertising circles. He attended the University of Cincinnati and more recently taught the class in Advertising at Heidelberg College, Tiffin, Ohio.

Mr. Robers is a member of the Industrial Marketers of Cleveland, a chapter of the N. I. A. A. and is also a member of the Cleveland Advertising Club.

In announcing the appointment of Mr. Strachan, Mr. Weatherhead emphasized the present efforts of the company in broadening its line of refrigeration valves, fittings and accessories for both manufacturers and jobbers in the refrigeration field.

S S S

## NEW CATALOGS AND BULLETINS

GETTING right down to the bottom of the condensation drip problem, the 32-page NoDrip Handbook tells how to prevent and cure damaging condensation and sweat that forms on precious metal pipes and fixtures, on basement walls, ceilings of concrete, wood, plaster, etc.

Up-to-the-minute, quick tempoed, it presents the solution, with illustrations, of recurrent and destructive conditions of dampness and corrosion.

Instructions as to application, coverage, drying time; complete listings of the many uses for NoDrip; and other valuable data, all in an at-a-glance contents list right on the front cover of the book.

Copy of the Handbook will be sent on request to J. W. Mortell Co., Kankakee, Ill.

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HELP WANTED: Male, two shopmen, foreman, two servicemen, experienced commercial or domestic. Essential civilian, hospital, war-work. This is a permanent position with a good salary for those who want to settle in New York City with a company established for 12 years. Box MR.-10, The Refrigeration Service Engineer, 433 N. Waller Avenue, Chicago, Illinois.

COMPLETE high side Frigidaire, ⅓ to ½ h.p. air cooled, less motor, $15.00. ⅓ to ½ h.p. air cooled condenser, $6.00. ⅓ to ½ h.p. 2 cylinder Frigidaire compressor, $7.00. All used in good condition, F.O.B. Edison Cooling Corp., 310 E. 149th St., New York City.

PEACE WILL BRING CHANGES AND IMPROVEMENTS in refrigeration methods and equipment. Do you have a practical idea NOW to improve existing equipment or for a new piece of equipment? Complete all necessary patent procedures NOW in order to be in position to negotiate with manufacturers when industrial production is again our primary aim. Send for free 48-page illustrated book containing valuable information about patents, sale of inventions and other information of value to men with practical ideas. Write today. Victor J. Evans & Co., 776-C Merlin Building, Washington, D. C.


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FEATURES

- Readily removed orifice cartridges eliminates necessity for stocking several sizes for low tonnage installations.
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- Thoroughly field tested.
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WE EXPECT to be able to supply the current requirements of the refrigeration industry for Methyl Chloride, subject to the regulations of the War Production Board. Order what you need but please do not stock up unnecessarily. Electrochemicals Department, E. I. du Pont de Nemours & Company (Inc.), Wilmington, Delaware.

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**IMPORTANT**

**Don't let idle cylinders hold up supplies now available. Look through your stocks and warehouses for any empty cylinders, or cylinders which can be emptied . . . and return them promptly.**

WHY DON'T YOU STOP LOOKING!
YOU WON'T FIND A DRYING AGENT WITH A CAPACITY THAT EVEN COMES CLOSE TO DAVCO SILICA GEL
GREATER CAPACITY . . .
1½ to 2 times as much as other drying agents
ACTS INSTANTLY . . . .
REMOVES ACIDS . . . .
WILL NOT DUST NOR POWDER
No wonder so many successful service engineers standardize on Davison's Silica Gell It gives them everything they demand in a drying agent.
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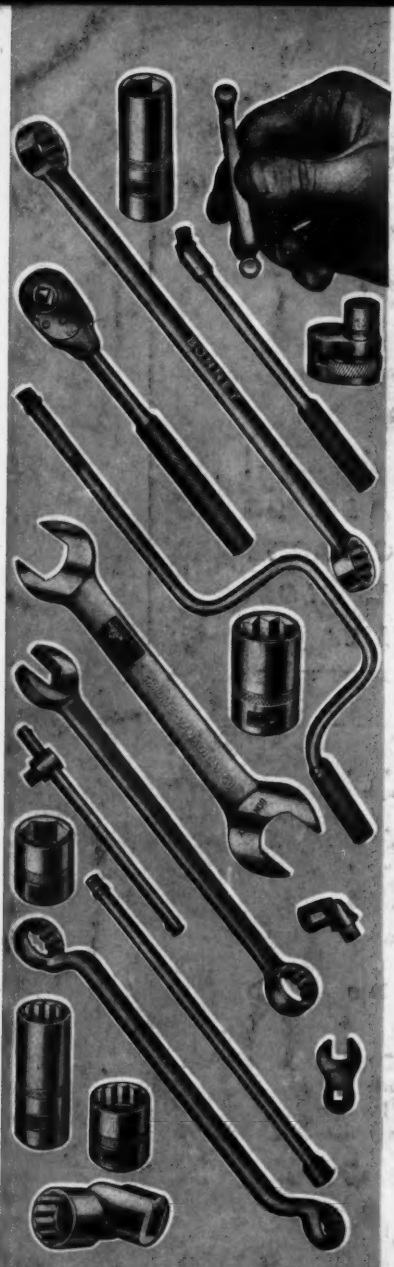

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THE biggest job you've ever tackled faces you and your kit of BONNEY TOOLS. You must help to keep millions of domestic and commercial refrigeration units running for the duration with less replacement parts available than ever before and *with your present tool kit.*

Because of the huge demands of our Armed Forces for BONNEY TOOLS, those you have must last for the duration. So *be smart.* Take better care of them than you ever did before.

You know as well as we do that more tools are ruined from abuse than are worn out from use. Stop abusing *your* tools. These few suggestions will help you get the most out of them—

Make sure you use the *right* BONNEY TOOL for every job . . . the *right size* as well as the *right type. Don't* use a screw driver as a pry bar and expect it to remain in good condition. It won't.

*Stop* using a pipe over the end of a wrench or socket extension for added leverage . . . unless you don't care about ruining the tool and perhaps hurting yourself.

*Stop* throwing them on the floor, kicking them around . . . you wouldn't kick a $5.00 bill around very long. It's just as easy to put them back in your tool box and they will *last* longer.

You'll be doing yourself a real service if you follow this common-sense advice. Remember, *you* + your present BONNEY TOOL kit have a big service job to do. *Be smart.* It will pay dividends.

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